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INSTRUCTION BOOK

TANDEM PROCESSING SUBSYSTEM (OSP)

PART OF

FLIGHT SEVICE AUTOMATION SYSTEM

VOLUME I

CONTRACT DTFA01-81-C-10039

CONTRACTOR

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VOLUME 1

Serial Number

094

TANDEM

NonStop II™
NonStop EXP™

Operations and Service Processor User Guide

Subsystem Maintenance Manual

Part No. 82801

RECORD OF CHANGES

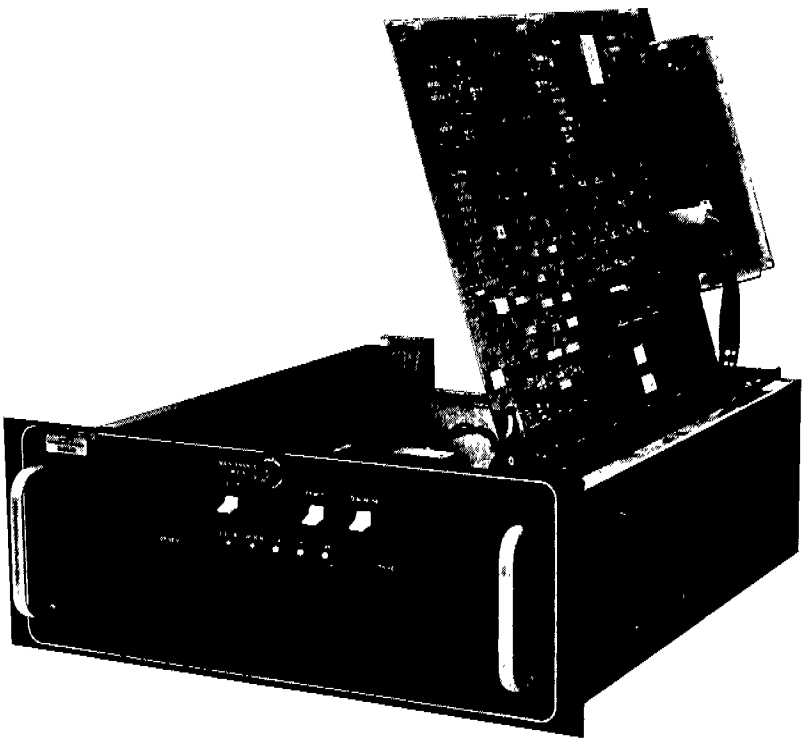
CHANGE TO BASIC	SUPPLEMENTS			OPTIONAL USE	CHANGE TO BASIC	SUPPLEMENTS			OPTIONAL USE

THIRD LEVEL

MAINTENANCE MANUAL

NonStop II (TM)
NonStop TXP (TM)

OPERATIONS AND SERVICE PROCESSOR USER GUIDE



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Tandem Part No. 82801-C00

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SECTION 1
INTRODUCTION

1.0 INTRODUCTION

The Operations and Service Processor (OSP) is intended to be the principal tool by which field maintenance personnel troubleshoot a failed processor or system. It is specifically designed to operate with the Tandem NonStop II and NonStop TXP systems and is not available for use with the earlier Tandem NonStop system.

A component of the CPU called the Diagnostic Data Transceiver (DDT) enables the OSP to get status information from each CPU of the system without interfering with normal operation of the system. The DDT and a device called the Processor Maintenance Interface (PMI), which links processors in a chain whose terminus is the OSP, enables the OSP to do operations on a single processor or a group of processors.

Special Microdiagnostics, which are loaded from an OSP floppy disc, allow the testing of a faulty processor and its main memory without using the production resources of the system.

Provision for remote operation of the OSP has been made to allow the diagnosis of a failed system from a remote site.

These and many other features of the OSP Subsystem are described in this manual.

1.1 USES OF THE OSP

The OSP consists of an interactive terminal and logic board assembly (including a floppy-disc controller) that functions in three modes: as a conversational terminal, as a status reporting terminal, and as a system maintenance terminal.

1.1.1 Conversational Terminal

The OSP as a conversational terminal offers most of the functions of an ordinary terminal; in addition, it gives the user the facilities necessary to run SHADOW and standalone diagnostics from the OSP.

1.1.2 System Status Reporting Terminal

The OSP can display Console Messages or direct them to an optional printer. It informs the operator of the status of all processors on the system, and the operator may select a single processor at a time to receive much more extensive information about that processor.

1.1.3 System Maintenance Terminal

In addition to typical operator tasks, certain OSP functions are reserved for customer engineers or systems analysts. In these modes, enabled by the keyswitch, operator functions include: performing a system cold load, running diagnostics (including special diagnostics that are loaded from OSP floppy discs), and dumping the contents of the memory to magnetic tape. The OSP user is also provided with a low-level mode debugger.

1.2 REFERENCED DOCUMENTS

The documents listed below are referenced in this manual.

a. NonStop II Operations and Service Processor Maintenance Manual, Part Number 82846-B00.

b. NonStop TXP Processor Subsystem Maintenance Manual, Part Number 82885.

c. NonStop II Diagnostic Operating Procedures, Part Number 82803.

d. NonStop TXP Diagnostic Operating Procedures, Part Number 82804.

e. NonStop II System Description Manual, Part Number 82077-C00.

f. NonStop II System Management Manual, Part Number 82069-F00.

g. GUARDIAN Operating System Command Language and Utilities Manual, Part Number 82073-D00.

h. Debug Reference Manual, Part Number 82098-A00.

SECTION 2
OSP DESCRIPTION

2.0 OSP DESCRIPTION

The Operations and Service Processor (OSP) is the control center for the NonStop II and NonStop TXP systems. Through the OSP, operators can invoke all the essential functions of the control panel for every processor. It offers both local and remote operations and provides maintenance capabilities.

As shown in Figure 2-1, the OSP is connected to each processor through the Processor Maintenance Interface (PMI), described in paragraph 2.2, and the Diagnostic Data Transreceiver (DDT), described in paragraph 2.3.

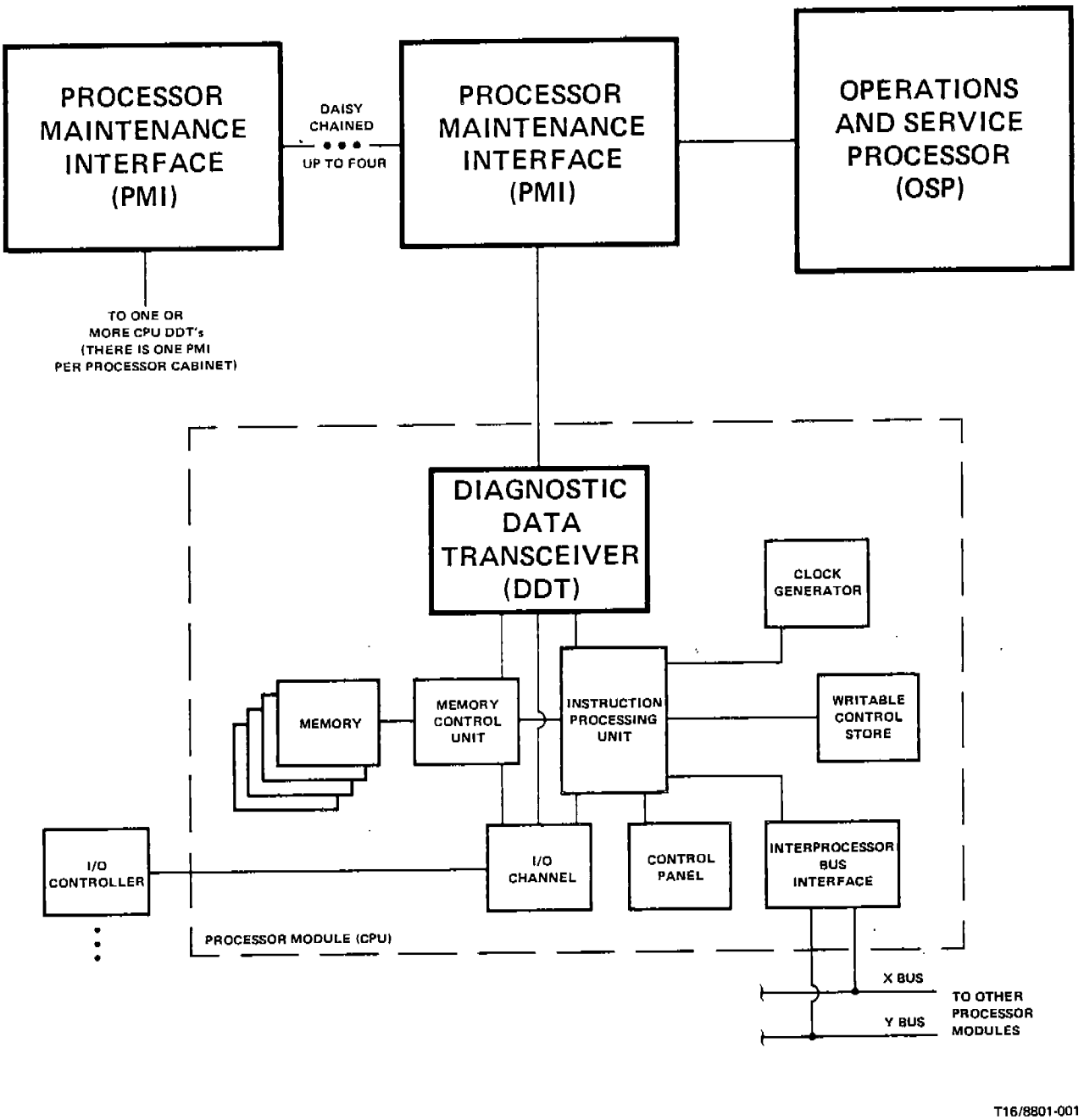


Figure 2-1 OSP/System Configuration

2.1 MAJOR COMPONENTS OF THE OSP SUBSYSTEM

The OSP includes the following major components, as shown in Figure 2-2.

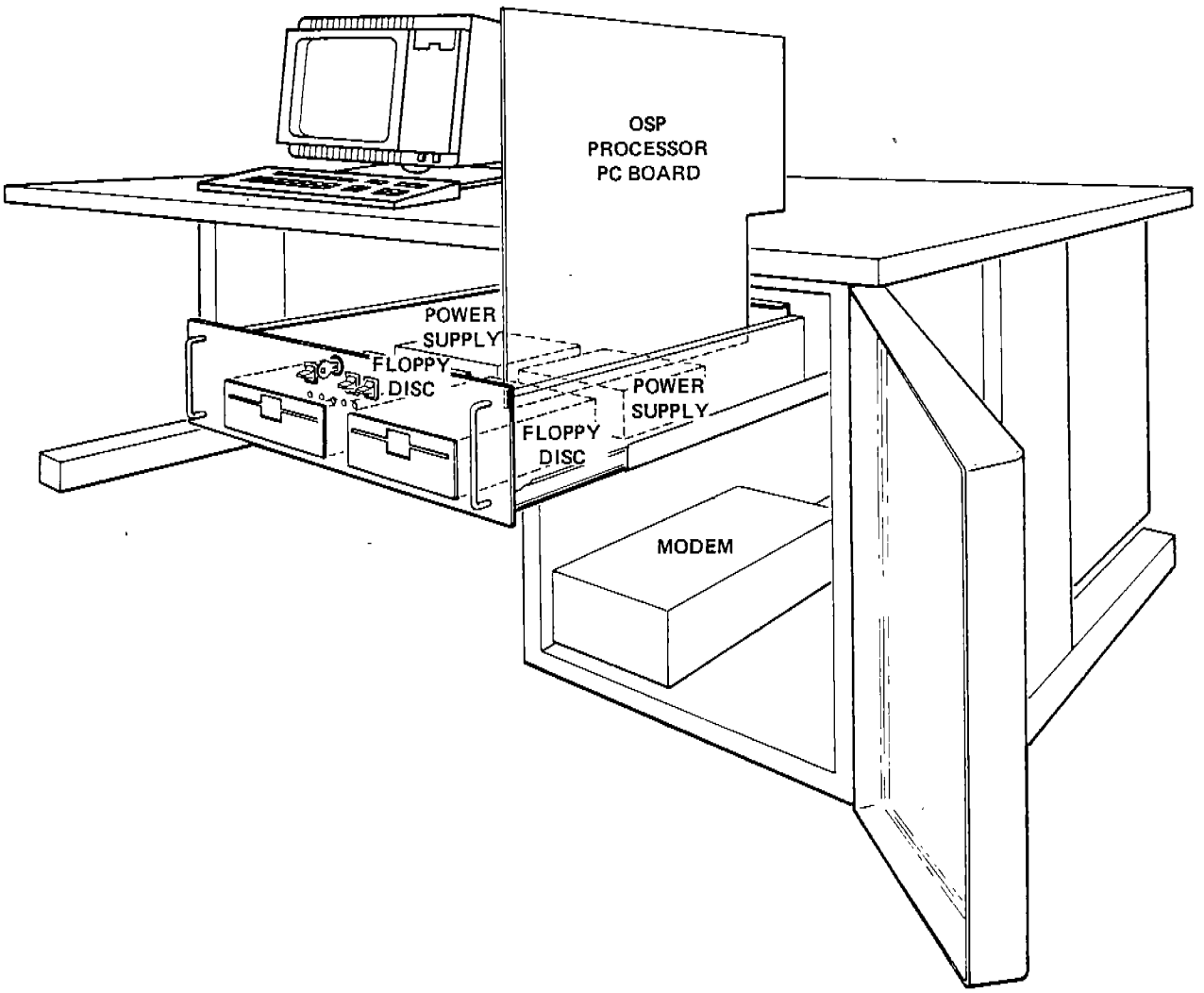


Figure 2-2 Major Components of the OSP Subsystem

2.1.1 System Maintenance Processor

The System Maintenance Processor (SMP) is the control and communication center for the OSP system. It is a single circuit board located in the OSP module drawer of the OSP subsystem cabinet. Users seeking a more thorough technical understanding of the SMP may consult the NonStop II Operations and Service Processor Maintenance Manual, Part Number 82846-B00, or the NonStop TXP Processor Subsystem Maintenance Manual, Part Number 82885.

2.1.2 Video Display Unit

The OSP Video Display Unit (VDU) is either the 6520 or the 6530 terminal that is used with Tandem computers. For use with the OSP, however, the function keys have been redefined; these redefined function keys and the special displays associated with them are described in Section 4 of this manual.

2.1.3 Floppy Disc Drives

The OSP system is equipped with two mini-floppy disc drives that are used to load the OSP operating system, OSP Self-Test Diagnostics, and special CPU and Memory Microdiagnostics into the OSP. The loading of the floppy discs is explained in section 3.4 of this manual.

2.1.4 Modem

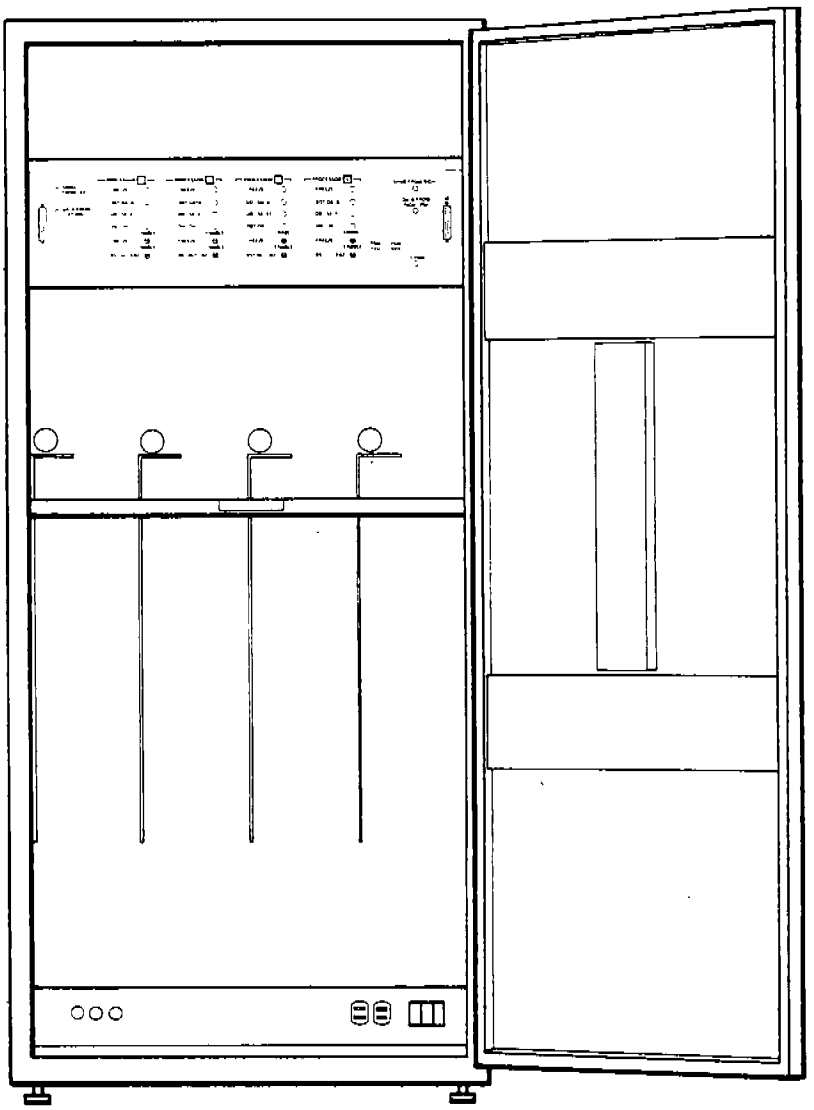
A Bell-type 212A modem, or equivalent, enables many of the OSP functions to be performed from a remote location. Applications of the modem are described in paragraph 3.3.1 of this manual.

2.1.5 Printer

For users who desire a hard-copy log of system activity, the 5520 printer is available. Data output to the printer is described in paragraph 3.3.2 of this manual.

2.2 PROCESSOR MAINTENANCE INTERFACE

The PMI is the device that makes possible the connection of all processors on the system to the OSP over a single cable. The PMI is mounted on a processor bay patch panel located directly behind the processor backplane of the CPU cabinet, as shown in Figure 2-3. A maximum of four processors can connect to a single PMI. If there is more than one processor cabinet in the system, a PMI is added for each cabinet, and all PMI assemblies are daisy-chained together. At the start of the chain, a single cable connects the last PMI assembly to the OSP.



REAR-VIEW CPU CABINET

T16/8801-003

Figure 2-3 Location of PMI Panel

2.3 DIAGNOSTIC DATA TRANSCEIVER

The DDT resides on the CCD (Channel, Control Store, and DDT) board of a NonStop II processor and on the CC (Channel and DDT) board of a NonStop TXP processor, providing the interface between the CPU and the OSP. Connected to the OSP through the PMI, the DDT communicates in two distinct manners: it provides communication services to Control Store programs for the NonStop II, and it gathers and returns the internal processor state to the OSP for both systems. The OSP reports on the status of the processor as a whole. If any hardware failure (parity error) occurs, the DDT reports the error to the OSP, along with the detecting board.

SECTION 3
OSP OPERATION

3.0 OSP OPERATION

This section describes the physical operation of the OSP. Section 4, which follows, shows the screens as they are displayed on the OSP terminal and provides information for interpreting them.

3.1 OSP SWITCHES AND INDICATORS

The OSP has switches and indicators that help operators load operating code and interpret data displayed at the terminal. Except for the power switch, which is located on the back panel of the OSP, as shown in Figure 3-1, these switches and indicators are mounted on the OSP front panel, as shown in Figure 3-2.

3.1.1 AC Power Switch

In the on, or up, position this switch supplies AC power to the OSP at Power-On or Reset. At the same time, it causes a self-test that verifies that some portions of the OSP are operational. If the test is successful, the OSP OK and OSP RUN indicators on the module panel light. If the test detects an error, these indicators do not light, and failures are reported in one of two ways:

a. If possible, an error message is displayed at the terminal indicating the sources of the error. (A description of possible error messages appears in Appendix A.)

b. If no message appears on the screen within five seconds, the appropriate LED indicators on the SMP board light. Operators should check section 5 of the Operations and Service Processor Maintenance Manual, Part Number 82846-B00, on troubleshooting.

When the self-test is successful, the operator can select the Extended Self Test Procedures (which is displayed as a menu) or the OSP operating system bootstrap operation, which loads the code to execute the normal functions of OSP. If the bootstrap operation is successful, an initial summary status report is displayed, as described in paragraph 4.5.

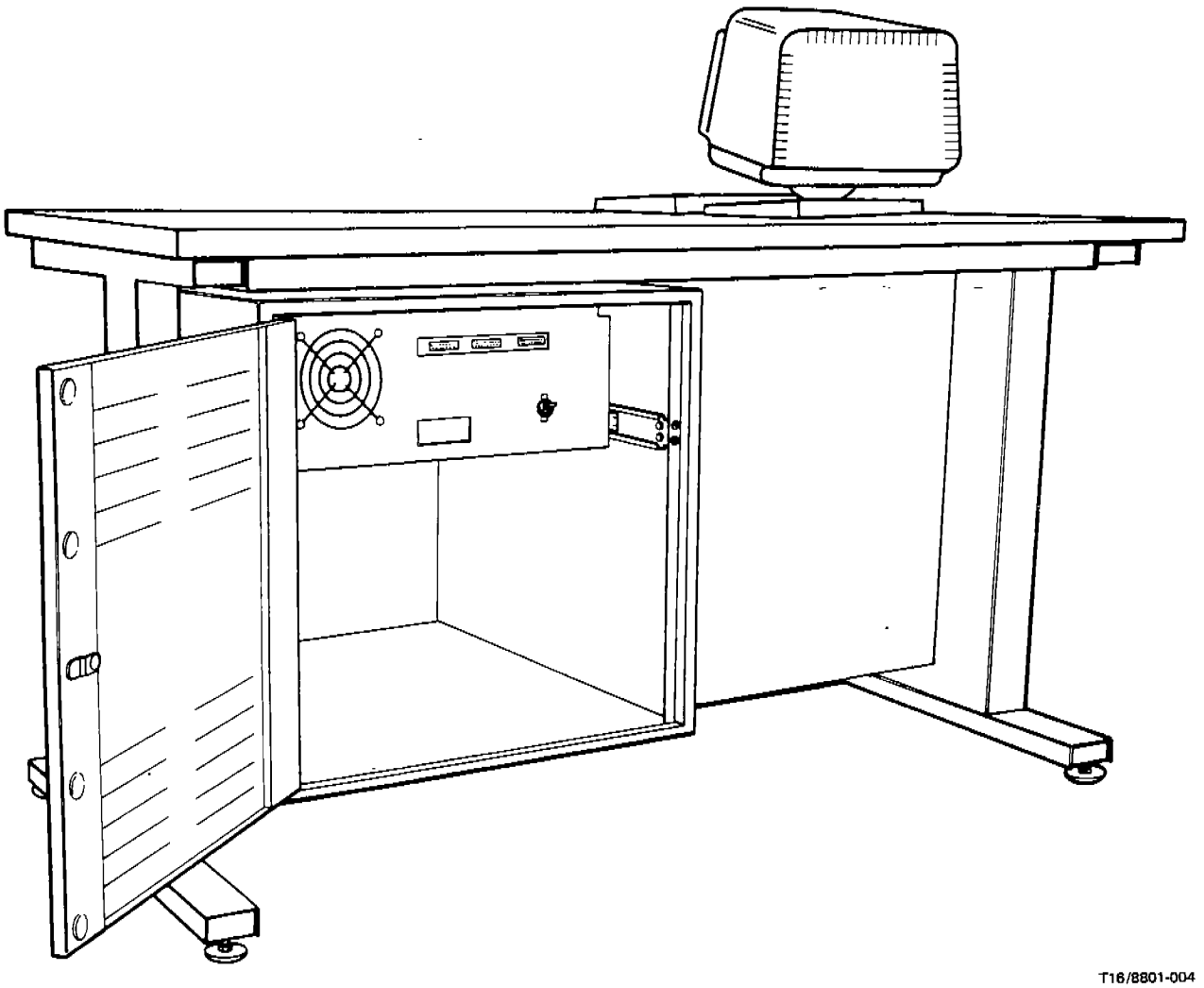


Figure 3-1 OSP Back Panel Showing AC Power Switch

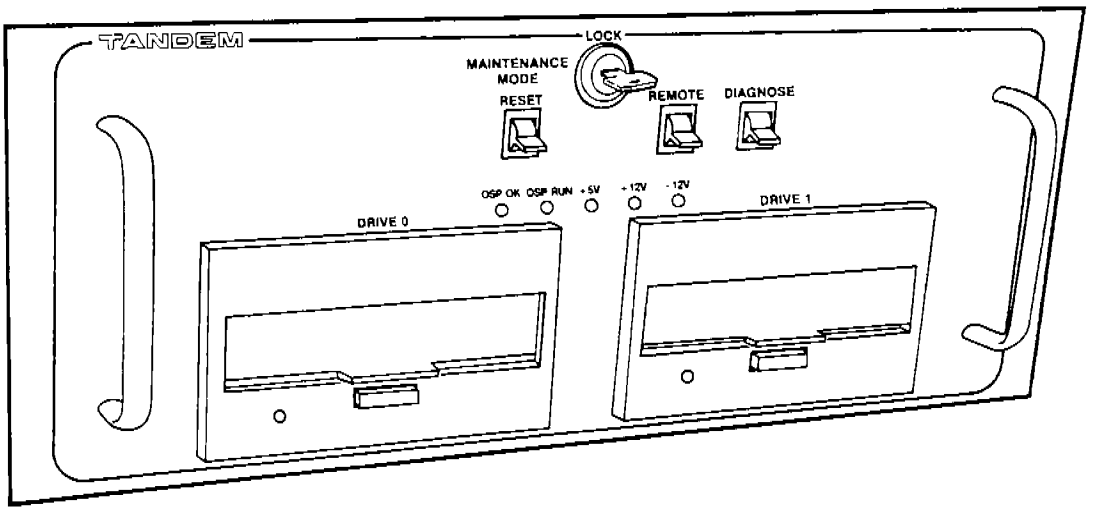


Figure 3-2 OSP Chassis Front Panel

3.1.2 Reset Switch

Toggling this switch up causes the OSP to execute the self-test. When self-testing finishes, the operator can select the Extended Self Test or the OSP bootstrap operation. This choice is based on the DIAGNOSE switch setting described in paragraph 3.1.4.

3.1.3 Maintenance Mode Keyswitch

This keyswitch provides access security for the DIAGNOSE and REMOTE switches. In the maintenance mode position (key turned counterclockwise), it enables remote and diagnose functions. In the locked position (key turned clockwise), the diagnostic functions and remote operation over the modem are disabled. The key can be removed only in the locked position.

3.1.4 Diagnose Switch

After Power-On or Reset, if this switch is in the DIAGNOSE, or up, position, the OSP Extended Self Test Procedures (ESP) can be entered for extended self-testing. Enabled, it also allows the special processor diagnostics and LOBUG, permits maintenance functions, and makes possible modification of most of the display fields. When the switch is in the normal, or down, position, the terminal acts primarily as a display terminal. No modification can be made from the OSP to change the state of the processors.

3.1.5 Remote Switch

When this switch is in the REMOTE, or up, position, a remote user may control the OSP subsystem through either the Remote Passthrough or Remote Cooperative mode, explained in paragraphs 4.10 and 4.11 of this manual. When the switch is in the local, or down, position, the terminal handles all commands and display responses with direct communication to the local OSP subsystem.

3.1.6 OSP LED Indicators

Table 3.1 outlines the significance of the lights on the OSP panel.

Table 3.1 OSP LED Indicators

INDICATOR	FUNCTION
+5V, +12V, -12V	Lit when the OSP logic power supplies are switched on and the proper voltage levels are present.
RUN	Lit when the OSP microprocessor is functional.
OSP OK	Turned off with the system Power-On/Reset and remains off until the self-test completes. If the self-test fails, an error message is displayed. The OSP OK light is lit with the successful completion of the self-test and remains on unless an OSP internal error is detected.

3.2 PMI SWITCHES AND INDICATORS

The Processor Maintenance Interface (PMI) has switches and indicators that help operators isolate faulty components from the common interface. As shown in Figure 3-3, these are mounted on the PMI at the rear of the CPU cabinet (see Figure 2-3). In addition to eight switches, each PMI panel has groups of lights (LED indicators) that report on the signal flow in the PMI chain, the status of the DDT, and the power to the PMI circuits.

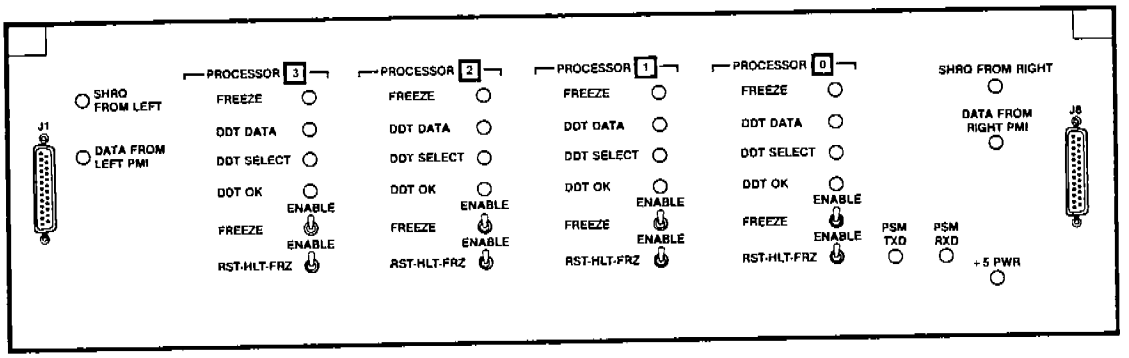


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Figure 3-3 Processor Maintenance Interface (PMI) Panel

3.2.1 Definitions of Processor Control Functions

The processor control functions employing the PMI switches and indicators use some terms that need to be clarified. These are defined in Table 3.2.

Table 3.2 Definitions of Processor Control Functions

TERM	DEFINITION
Halt Loop	A Halt Loop is a special microcode loop in which the processor executes no software but, instead, accepts commands from the OSP or processor control panel.
Local Halt	Local Halt is a request by the OSP, through the DDT of a particular processor, to place that processor in a Halt Loop. Only the selected processor responds to the halt request.
Freeze	There are two meanings of "freeze" as applied to the operation of the OSP: a. Freeze, in the context of a system freeze, means that all the processors in the system are in a Halt Loop. This can be caused either by a command from the OSP or by assertion of the Processor System Halt Request (PSHRQ) by any processor on the system. (Only processors that have the PMI Freeze switch in the enable position can issue or respond to system freeze requests.) This meaning of freeze applies to the command portions of the Special Display screens and to the switch position designations (PMI and OSP front panel switches). A Freeze command from the OSP is, in fact, a System Halt command. b. Freeze, when used to describe the state of the processor, means that the processor clocks have been frozen because of an internal error such as a parity error or channel freeze (NonStop II only). This freeze cannot be induced by a Freeze command from the OSP nor by a System Halt request from another processor.

Table 3.2 Definitions of Processor Control Functions (Cont'd)

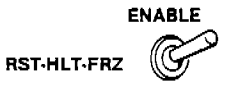
TERM	DEFINITION
Reset	Reset forces simple processor checks to be performed. If these succeed, the processor is initialized, the freeze is removed, and the processor goes into a halt loop. Reset also cancels any Local Halt (LHLT), DDT System Halt Request (DSHRQ), and Processor System Halt Request (PSHRQ) that may have been asserted by this processor. If a system freeze request originated in the reset processor and if no other requests have been issued, all other processors frozen by this request exit the Halt Loop and resume operation.
Run	Run cancels a Local Halt request asserted by a specific processor and allows the processor to exit the Halt Loop. Run also cancels a processor-requested system (PSHRQ) freeze if it originated in this processor. If no other processor has requested a system freeze, all processors frozen by the cancelled request exit the Halt Loop and resume operation.
Thaw	Thaw cancels a system freeze requested by the OSP or a processor. If no other system freeze request has been made, all other processors frozen by the cancelled request exit the Halt Halt Loop and resume operation.

3.2.2 FREEZE Enable Switch (Each Processor)

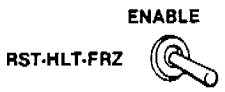
In the Enable, or up, position this switch allows this processor to be frozen and placed in a Halt Loop through a Freeze request sent either from the OSP or from another processor, and enables this processor to freeze other processors by means of a System Halt request.

In the disable, or down, position this switch prevents all other processors in the system, as well as the OSP, from freezing this processor, and prevents this processor from freezing the other processors in the system.

3.2.3 RST-HLT-FRZ Enable Switch (Each Processor)



In the Enable, or up, position this switch allows this processor to be reset and placed in a Halt Loop from the OSP.



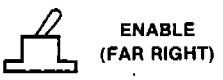
In the disable, or down, position this switch prevents this processor from being reset or halted from the OSP. It does not prevent software from freezing the processor or requesting a system freeze.

NOTE

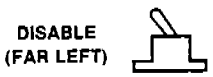
In both of these cases, the OSP may request the inhibited function; however, the DDT rejects the request.

3.2.4 DDT Enable Switch (Each Processor)

The DDT Enable switch allows the disconnection of a Diagnostic Data Transceiver (DDT) from the common processor-to-OSP interface. As shown in Figure 3-4, this switch is located on the top edge of the printed circuit board behind the PMI panel. To access this switch, release the panel and the hold-down screws, and pivot the panel down.



The Enable, or far right, position allows communication through the common serial lines between the associated processor and the OSP.



The Disable, or far left, position removes this DDT from the common interface, permitting the continued use of the PMI and OSP by other processors even though this DDT is faulty.

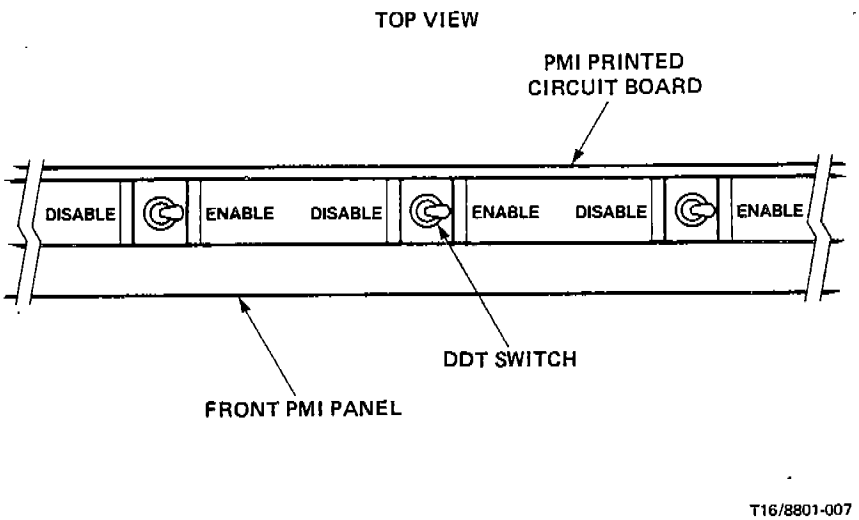


Figure 3-4 Location of DDT Enable Switch (PMI)

3.2.5 PMI LED Indicators

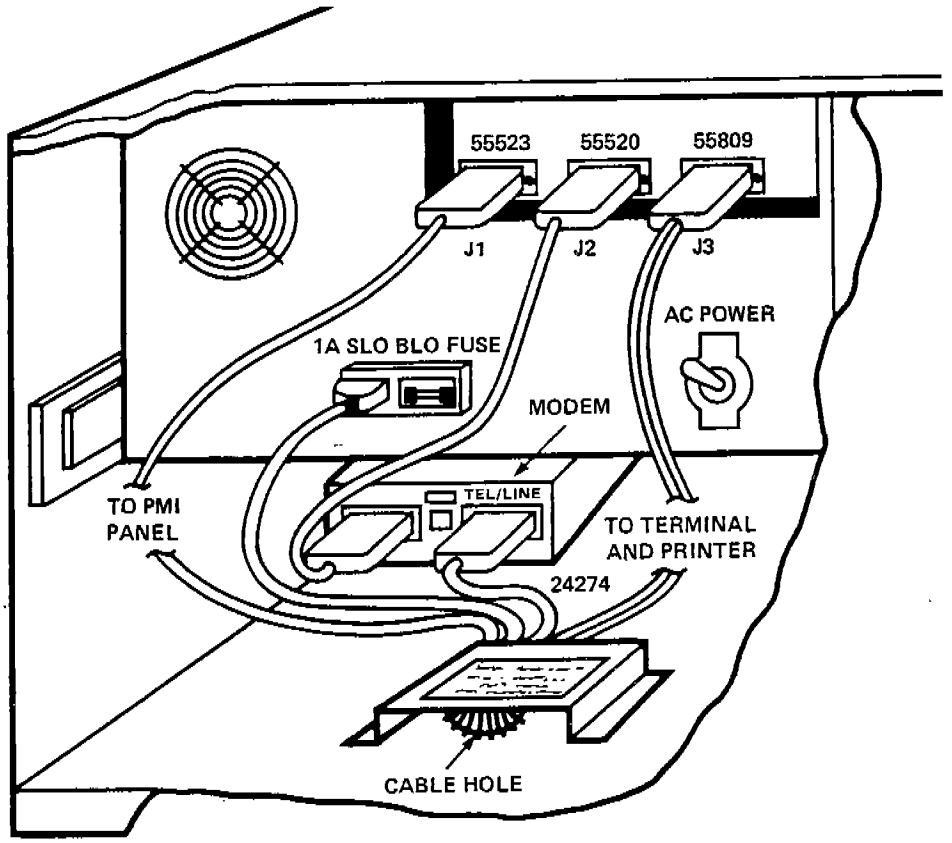
Table 3.3 outlines the significance of the lights on the PMI panel.

Table 3.3 Processor Maintenance Interface (PMI) LED Indicators

INDICATOR	FUNCTION
FREEZE (each processor)	Lit when a system freeze request exists in this processor. If the Freeze Enable switch is in the down position, however, this request is not acted upon by other processors.
DDT DATA (each processor)	Flashing when data is present on the serial data line from the associated DDT to the OSP.
DDT SELECT (each processor)	Lit if the DDT has been selected by the OSP. Only one DDT Select indicator should be lit in the system. The DDT Select LEDs flash during polling, as each DDT is selected in turn.
DDT OK (each processor)	Lit if the DDT has turned on the XMT line.
SHRQ FROM LEFT	Lit if a System Halt Request is asserted by the PMI to the left in the PMI chain.
SHRQ FROM RIGHT	Lit if a System Halt Request is asserted by the PMI to the right in the PMI chain.
PSM TXD	Flashing when data is present on the serial data line from the OSP to the power supplies.
PSM RXD	Flashing when data is present on the serial data line from the power supplies to the OSP.
DATA FROM LEFT	Flashing when data is being transmitted to the OSP by the DDT of a PMI to the left in the PMI chain.
DATA FROM RIGHT	Flashing when data is being transmitted from the OSP to all DDTs.
+5 PWR	Lit if +5V power is present in the PMI circuits.

3.3 OSP CABLE CONNECTORS

As shown in Figure 3-5, the back panel of the OSP also provides three connectors for cables to attach devices to the OSP: J1 leading to the PMI, J2 to a modem, and J3 to the terminal and an optional printer.



OSP REAR VIEW

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Figure 3-5 OSP Back Panel Showing Cable Attachments

3.3.1 Modem Switches and Indicators

The modem interface allows the OSP to communicate over the dial-up phone network with a remote site (a Tandem service center). The T212A modem has a three-position switch mounted on the telephone, which controls the Talk, Autoanswer, and Data modes of operation. The switch positions and corresponding functions are given in Table 3.4.

Table 3.4 Modem Talk/Data Switch

SWITCH POSITION	FUNCTION
TALK	This position enables voice communication over the telephone and switched network.
AUTOANSWER	This position enables the data set automatically to answer an incoming call, permitting remote unattended operation of the OSP.
DATA	This position enables normal data transmission and reception, and the various test modes.

As shown in Figure 3-6, seven indicators and four controls are located on the front panel of the data set. Detailed information on the operation of the T212A data set is provided in Rixon Inc. Bulletin 5454.

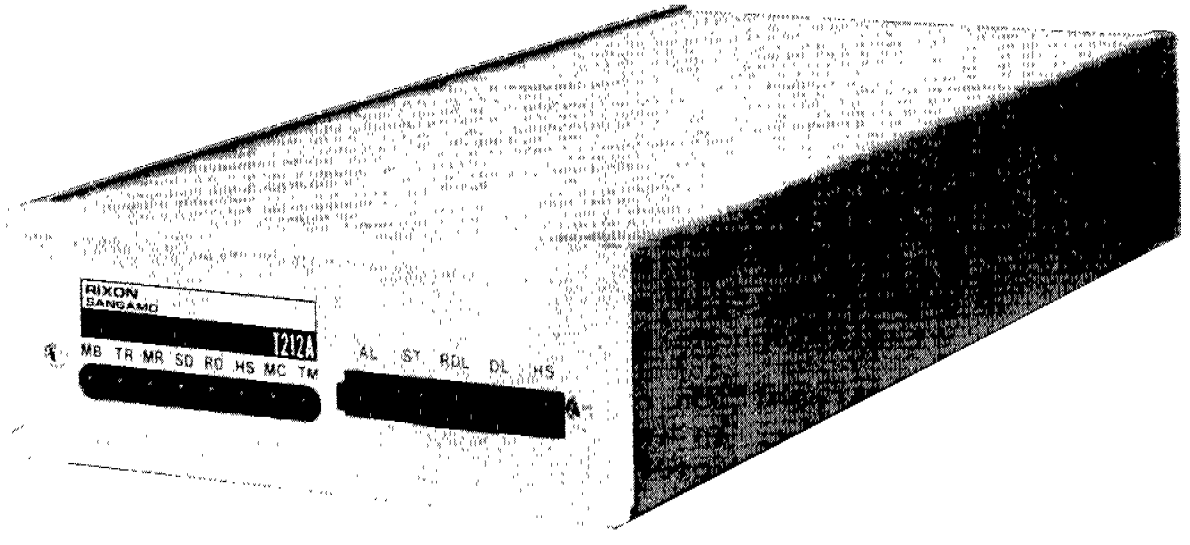

Figure 3-6 T212A Modem

The seven LED status indicators on the modem front panel display system operation as listed in Table 3.5. In the low speed mode, the modem operates asynchronously at a maximum of 300 baud; on the high speed mode, it operates asynchronously at 1200 baud.

Table 3.5 Modem Indicators

LIGHT	FUNCTION
TR	Terminal Ready
MR	Modem Ready
SD	Send Data
RD	Receive Data
MC	Modem Check
TM	Test Mode
HS	High Speed (1200 baud)

Of the five buttons on the modem front panel, the HS button controls the speed (300 baud or 1200 baud), and the other three control modem self-tests as listed in Table 3.6.

Table 3.6 Modem Controls

CONTROL BUTTON	FUNCTION
AL	Analog Loopback
ST	Self-Test
RDL	Remote Digital Loopback
DL	Digital Loopback
HS	High Speed Select (1200 baud)

3.3.2 Printer (Optional)

The optional 5520 printer is available for use with the OSP. The following data is output to the printer.

a. All System Messages

b. All Critical Error Condition Messages

c. Conversational Terminal #1 I/O

d. A report of any System Freeze, Parity Freeze, or OSP initiated Breakpoint detected by the OSP

e. A report of any entry to Conversational Terminal #1 or #2, or the Debugger mode of the OSP and, at operator option (the operator must enter LOBUG and type the command: PRINTON), all I/O to the Debugger and Conversational Terminal #2.

f. A report of any access to Diagnose or Remote modes of the OSP

g. A report of any RESET, LOAD, FREEZE, THAW, HALT, or RUN command issued through the OSP.

3.4 PROCEDURE FOR LOADING THE OSP SUBSYSTEM

The OSP operating code is stored on the Site Update Tape (SUT) that is loaded onto a disc during system installation with the INSTALL program. It is then downloaded from that disc onto a diskette.

In supporting two processors, the NonStop II and the NonStop TXP, the OSP requires two floppy diskettes, one designated as the NonStop II diskette and the other as the NonStop TXP diskette. While both contain an OSP Operating System and either may boot the OSP system, the two provide different microdiagnostics and corresponding message handlers.

The software package that is loaded into the OSP at boot time is dependent on the memory capacity of the OSP being booted. If the OSP has limited memory, the LEVEL 1 BOOT loads the software that supports the NonStop II only, and the following message appears:

```
WARNING - Booting OSP Operating System for NonStop II processor
                                                    support only
```

If the OSP being booted has the additional memory, the LEVEL 1 BOOT loads the software that supports both the NonStop II and the NonStop TXP systems. No warning message is displayed in this case.

The OSP operating code is loaded into the OSP memory, after completion of the Power-On (PON) self-test, by a PROM-resident bootstrap routine. The start-up procedure is as follows:

a. Toggle the DIAGNOSE switch to the down position to prevent the OSP from entering the Extended Self Test Procedures (ESP) diagnostic.

b. Turn on (in the up position) the AC POWER switch located on the back of the OSP subsystem cabinet.

   This switch applies power to the floppy disc drives and the OSP logic power supplies, and starts the OSP PROM-resident self-test routine, which takes approximately thirty seconds to complete. (If the test is not successful, failures are reported as explained in paragraph 3.1.1 of this manual.)

c. Remove the diskette from the storage envelope. Make sure that there is a write-protect tab covering the write-protect notch, as shown in Figure 3-7, to protect against writing over the code.

CAUTION

Do not power on the OSP with the diskette in the disc drive; the heads may destroy data even with the write-protect tab.

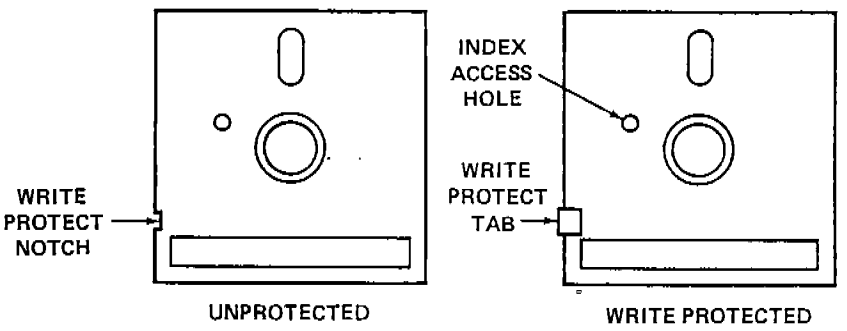

Figure 3-7 Diskette

d. As shown in Figure 3-8, push on the door latch to open the door of the floppy disc drive. (Drive 0 is preferred for faster access to the diskette.)

e. With the index hole to the left of the large center hole, as shown in Figure 3-8, insert the diskette into either of the two drives. For systems that are both NonStop II and NonStop TXP, place one diskette in drive 0, the other in drive 1; the order does not matter. Push the diskette forward until it clicks.

f. As shown in Figure 3-8, push the door down until it locks into position. The drive motor turns on and, after three seconds, the drive is ready to load the OSP operating system.

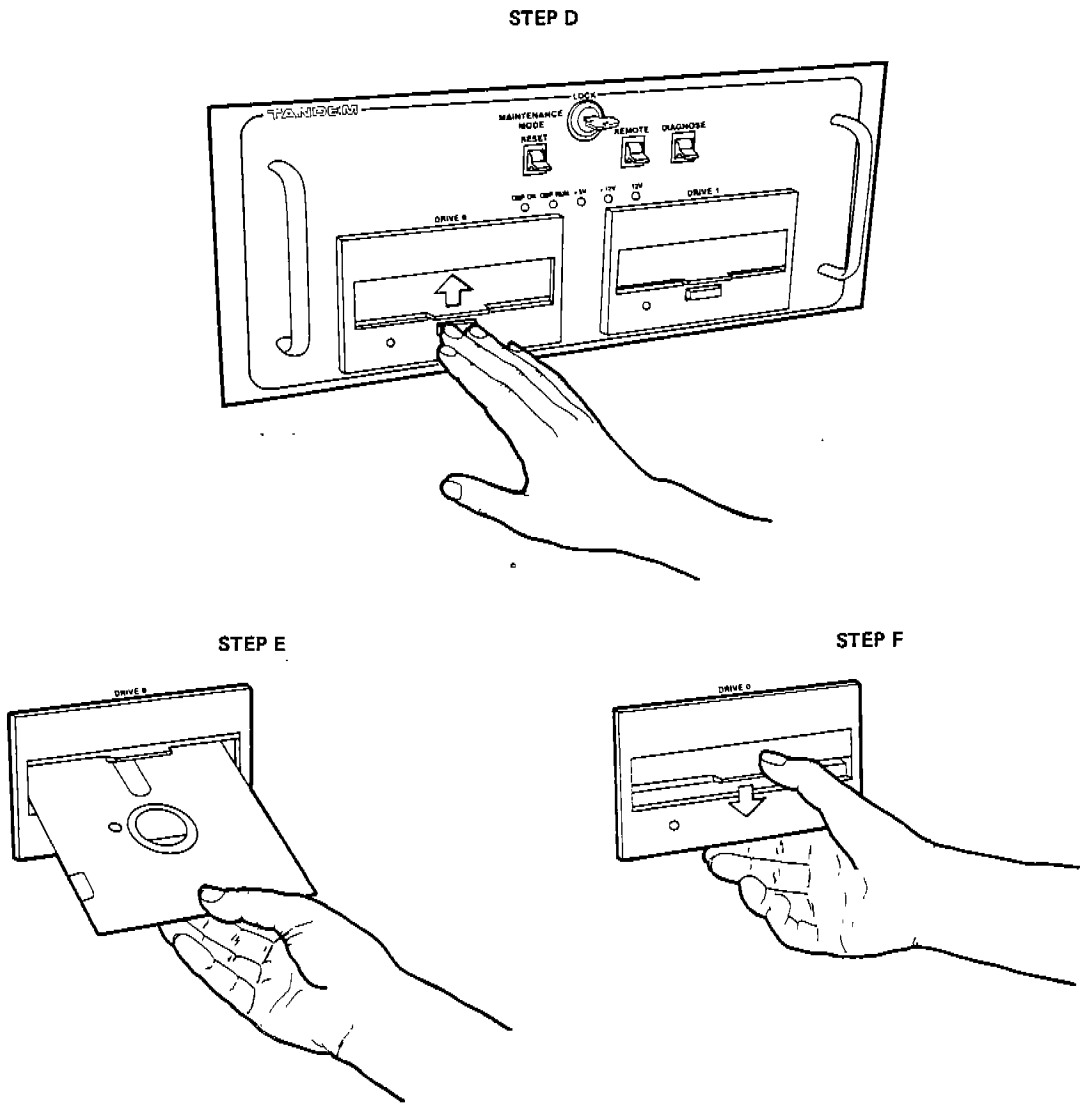

Figure 3-8 Loading the Diskette

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g. When the OSP self-test is finished, the TEST OK LED lights. If it is necessary to restart the self-test, toggle the RESET switch.

h. If the self-test completes successfully, the OSP bootstraps the OSP operating code, which takes approximately a minute. When the light on the floppy disc drive goes out, press on the door latch to release the door and eject the diskette. Replace the diskette in the storage envelope. (It is needed again for LOBUG and microdiagnostics.)

One of the following messages is displayed on the terminal screen once the terminal communications have been tested during the Power-On/Reset self-test:

a. For earlier NonStop II OSPs:

```
OSP POWER ON SELF-TEST - T9929A00-01DEC81
```

b. For later NonStop II and all NonStop TXP OSPs:

```
OSP Power On Self-Test - 42550 B00
```

If the self-test fails at some point after the terminal communications are tested, an error message appears on the screen. (A description of possible error messages appears in Appendix A.) If the self-test fails before the terminal communications are validated, no message can be displayed; in such a case, the appropriate LED indicators on the SMP board light. (Operators should check section 5 of the Operations and Service Processor Maintenance Manual, Part Number 82846, on troubleshooting.)

When the bootstrap completes, control is transferred from the self-test routine, and the OSP begins executing OSP operating code. A summary of the system status is displayed on the System Status Screen on the terminal, indicating that the OSP subsystem has been loaded successfully. (The OSP terminal function System Status Screen, Shifted F5, is described in section 4.5 of this manual.)

SECTION 4
OSP OPERATING MODES

4.0 OSP OPERATING MODES

Shifted function keys on the terminal select OSP operating modes and invoke corresponding display screens. Within each mode, unshifted function keys select various functions that the operator may perform.

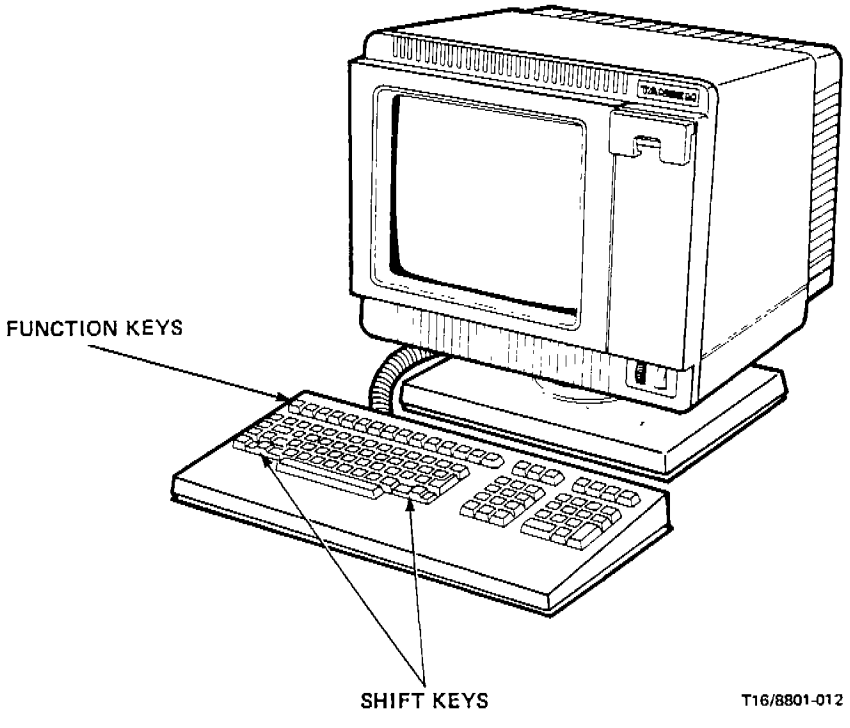

Figure 4-1 Terminal

Generally, to exit from one mode, simply invoke another. Exceptions to this exit procedure are described with the particular functions.

The function modes are summarized in Table 4.1.

Table 4.1 Terminal Function Modes

SHIFTED KEY	FUNCTION MODE	OPERATION
F1	Conversational Terminal # 1	Runs a conversational-mode machine-room Command Interpreter.
F2	Conversational Terminal # 2	Runs Tandem Customer Engineering diagnostics.
F3	Suppress/Restore Operator Console Messages	Turns on or off the operator console message display.
F4	Suppress/Restore Critical Error Condition Messages	Turns on or off the critical error conditions message display.
F5	System Status Screen	Displays a summary of status for all processors in the system.
F6	Processor Status Screen	Displays a status report on a selected processor. Cold loads are initiated in this mode.
F7	Execute Microdiagnostics	Runs diagnostics, downloaded from diskette.
F8	Not used	
F9	LOBUG	Allows low-level access to the system for debugging.

Table 4.1 Terminal Function Modes (Cont'd)

SHIFTED KEY	FUNCTION MODE	OPERATION
F10	Not used	
F11	Not used	
F12	Not used	
F13	Not used	
F14	Remote Service	Allows a remote user to gain control of the local PMI interface when the local OSP has been placed in the Remote Passthrough mode.
F15	Remote Passthrough	Passes data transmissions between the OSP in Remote Service mode and the PMI chain.
F16	Remote Cooperative	Allows a remote user to control the local OSP. This mode can be used for debugging.

In each of the status screens there are protected fields that cannot be written into from the OSP terminal keyboard, and other fields where the displayed data can be modified for transmission to the CPU through the DDT. Screen illustrations use the following notation to show the characteristics of the fields:

a. d = a decimal digit (0-9)

b. x = a binary digit (0 or 1)

c. o = an octal digit (0-7)

d. a = an ASCII character

e. [] = data that can be altered from the keyboard; all other fields are protected.

There is a set of error messages that can appear on the screen, indicating conditions that conflict with the commands entered into the OSP. These errors are explained in Appendix A.

4.1 CONVERSATIONAL TERMINAL # 1 (SHIFTED F1)

In the Conversational Terminal # 1 mode, the OSP terminal is controlled by a Command Interpreter, which can run normal conversational applications. In this state, the terminal differs in several ways from terminals attached directly to the system:

a. Transfers are limited to a maximum of 132 characters in either direction.

b. Block mode is not available; therefore, the Virtual Screen function of the Editor is not supported.

c. All output directed to the conversational terminal is copied to the optional hard-copy printer.

d. CTRL/A, CTRL/C, CTRL/Q, CTRL/R, and CTRL/S characters are not available for passwords in the Command Interpreter PASSWORD or LOGON commands.

To invoke the Conversational Terminal # 1 mode, press the shifted F1 key on the OSP terminal.

The unshifted function keys are undefined for this mode.

4.2 CONVERSATIONAL TERMINAL # 2 (SHIFTED F2)

In the Conversational Terminal # 2 mode, the OSP terminal is reserved for running diagnostics outside of GUARDIAN, such as the SHADOW diagnostics.

To invoke the Conversational Terminal # 2 mode, press the shifted F2 key on the OSP terminal.

The following paragraphs describe the load procedures for SHADOW and standalone diagnostics. The running of these diagnostics is described in "Diagnostic Operating Procedures," Part Number 82803.

There are three methods of loading a standalone diagnostic into a processor. The method chosen depends upon the operating situation:

a. Direct I/O Load from tape is used when the processor to be tested is physically connected to the tape drive.

b. Interprocessor Bus Load from tape is used when the processor to be tested does not have a tape drive physically attached, and both processors are off line.

c. Interprocessor Bus Load from tape or disc, from an online processor by means of the DIAGBOOT program, is used to run a diagnostic on an offline processor while the remaining processors of the system are running under GUARDIAN. Table 4.2 lists the panel light settings in the event of a diagnostic load error.

The direct I/O Load from tape and the Interprocessor Bus Load are described below in paragraphs 4.2.1 and 4.2.2. The Interprocessor Bus Load from an online processor using DIAGBOOT is further explained in "Diagnostic Operating Procedures," Part Number 82803.

4.2.1 Loading SHADOW and Standalones from Tape

Before loading a standalone diagnostic from tape, disable the PMI Freeze Enable switches of all processors.

NOTE

All processors which are to have diagnostics run on them must be on the poll list defined on the System Processors Status screen, shifted function key F5.

To load the diagnostic bootstrap from tape:

a. Select the processor physically connected to the tape drive where the diagnostic cold load tape is mounted, using the Processor Status screen, shifted function key F6.

b. Put the PMI Reset Enable switch of the processor to be tested in the enable position.

c. Depress function key F10 to reset the selected processor.

d. Type into the SWITCH RESISTER field:

   1. The subchannel number of the tape drive (controller and device) into the SWITCH REGISTER <8:15>

   2. Zeroes in SWITCH REGISTER <0:7>.

e. Depress function key F11 to load the processor.

f. Depress function key F2 (shifted) to enter Conversational Mode # 2. The OSP terminal operates in conversational mode, and the DIAGBOOT banner appears on the OSP terminal, followed by the prompt:

```
CPU dd FILE NAME?
```

where dd is the processor number in decimal.

g. Type the file name of the diagnostic operating system SHADOW or standalone diagnostic to be loaded, followed by a carriage return, for example:

SHADOW <cr>

The specified diagnostic program is found on tape and loaded, the tape rewinds, and the diagnostic begins execution.

4.2.2 Loading SHADOW and Standalones over the IPB

This section describes the method of loading SHADOW or any standalone diagnostic over the Interprocessor Bus; it assumes that a processor of the system already contains the diagnostic bootstrap, which was loaded by the method of paragraph 4.2.1.

NOTE

Whenever SHADOW or any standalone diagnostic is loaded over the Interprocessor Bus, there are two processors involved: the processor initiating the load and the processor under test.

If the processor to be tested is not the processor from which the tape was originally loaded, it may be loaded over the Interprocessor Bus by the following procedure:

a. Select the processor physically connected to the tape drive where the diagnostic cold load tape is mounted, using the Processor Status screen, shifted function key F6.

b. Put the PMI Reset Enable switch of the processor to be tested in the enable position.

c. Depress function key F10 to reset the processor to be tested.

d. Type "100000" into the SWITCH REGISTER field.

e. Depress function key F11 to load the processor.

f. Depress function key F2 (shifted) to enter Conversational Mode # 2. The OSP terminal operates in conversational mode, and the DIAGBOOT banner appears on the OSP terminal, followed by the prompt:

```
CPU dd FILE NAME?
```

where dd is the processor number in decimal.

g. Type the file name of the diagnostic program that is to be loaded, followed by a comma (,), the number of the processor to be loaded (decimal), and the bus to be used (X or Y), for example:

SHADOW,3Y

The specified diagnostic program is found on tape and loaded, the tape is rewound, and the diagnostic begins execution. The selected processor, from which the load occurred, now loops, waiting for a bus request from the processor under test or for SWITCH REGISTER bit 0 to be set true, indicating a BREAK request.

After the diagnostic has finished running in the processor under test and the processor under test has been Reset from the Processor Status screen (shifted F6), another processor of the system may be loaded from the Interprocessor Bus. The procedure given above for loading a processor from the IPB must be repeated for each processor to be tested.

NOTE

All processors to be loaded must have the Reset Enable switch of the PMI in the ENABLE position.

4.2.3 Diagnostic Load Error Indication

Errors detected during a diagnostic load operation are reported to the front panel lights. These errors may be decoded according to Table 4.2.

Table 4.2 Diagnostic Load Error Codes

DISPLAY	EXPLANATION
%000001	Tape problem (EIO)
%000003	Tape problem - cannot backspace (EIO)
%000004	Tape problem - cannot backspace (IIO)
%000005	Tape problem (IIO)
%000006	Tape problem - 10 retries failed (EIO)
%000007	Tape problem - unable to rewind (EIO)
%000010	Abnormal failure - unexpected interrupt
%000011	Abnormal failure - wrong page after counting memory
%000012	Not enough memory to load in standalone
%000013	Unable to output character to DIAGBOOT terminal
%000014	Unable to read character from DIAGBOOT terminal
%000015	Bad data on bus read
%000016	Unable to verify loading WCS
%000021	Unable to reposition NonStop TXP microcode disc file
%000022	Wrong NonStop TXP microcode type found off disc file
%000023	Wrong NonStop TXP microcode type found putting files to tape
%000030	Error in loading second level boot
%000033	Wrong processor type for boot
%000070	Attempt to read/write too many characters to DIAGBOOT
%010000 - %170000	Bad Interrupt Status Word (RIST) - O-I-A-P bits
(-11) %177765	Wrong position on tape
(-9) %177767	Unable to load initial bootstrap (EIO)
(-8) %177770	Abnormal failure - unexpected interrupt
(-6) %177772	Tape problem - 10 retries failed (EIO)
(-5) %177773	Tape problem - (IIO)
(-4) %177774	Tape problem - cannot backspace (EIO)
(-1) %177777	Tape problem - (EIO)

4.3 SUPPRESS/ENABLE OPERATOR CONSOLE MESSAGES (SHIFTED F3)

Shifted F3 does not invoke a mode; rather, it alternately disables and enables the output of operator console messages to the OSP terminal.

When the System Status Screen is displayed, the bottom section of the screen shows whether the messages have been enabled or disabled (refer to Figure 4-2 for the location of the messages). If the OSP is not in the System Status Screen mode, the status is reported on the 25th line of the current screen:

```
OPERATOR CONSOLE MESSAGES - DISABLED

OPERATOR CONSOLE MESSAGES - ENABLED
```

Console messages are logged to the optional hard-copy printer in either conversational or block mode.

A typical message contains (from left to right): a message number (optional), timestamp (including time and date), system number, CPU number, process identification number (pin), and the body of the message. Appendix B contains a complete list of the system console messages and meanings.

To invoke this function, press the shifted F3 key on the OSP terminal. Each subsequent depression of the key alternately suppresses and enables the output of console messages to the terminal.

Because this function does not invoke a mode, there is no need to exit.

4.4 SUPPRESS/ENABLE CRITICAL ERROR CONDITIONS (SHIFTED F4)

Shifted F4 does not invoke a mode; rather, it alternately disables and enables the output of critical error conditions to the OSP terminal.

If shifted F4 is pressed when the OSP terminal is not in the System Status Screen mode, the status of the disable/enable function is reported on the 25th line of the current screen:

```
CRITICAL Msgs - DISABLED

CRITICAL Msgs - ENABLED
```

When it is in conversational mode, the OSP displays GUARDIAN operating system messages that are important to the diagnosis of a failed processor or system. The occurrence of any of these messages is noted on the 25th line if the OSP terminal is in block mode:

```
CRITICAL SYSTEM ERROR DETECTED
```

Critical Error Condition Messages are distinguished by the character CTRL/G (BEL) joined to the listing, indicating that an audible alarm is sounded at the terminal when the message is received.

These messages are logged to the optional hard-copy printer in either conversational or block mode.

To invoke this function, press the shifted F4 key on the OSP terminal. Each subsequent depression of the key alternately suppresses and enables the output of critical error conditions to the terminal.

Because this function does not invoke a mode, there is no need to exit.

4.5 SYSTEM STATUS SCREEN (SHIFTED F5)

In the System Status Screen, the OSP displays a summary status report of all processors in the system. During an OSP power-on/ reset sequence, the OSP establishes the poll list and polls only those processors that respond properly to a select message. This screen is always displayed immediately following a successful diskette load of the OSP subsystem operating code.

To invoke the System Status Screen mode, press the shifted F5 key on the OSP terminal.

4.5.1 Mode-Defined Function Keys

Once the System Status Screen mode is invoked, unshifted function keys perform the following operations:

4.5.1.1 F1 (Establish Poll List)

Unshifted F1 sends the operator-modified processor poll list to the OSP (1 = processor is polled; 0 = no poll). Although the polling process runs continuously, the operator can modify an entry to update the poll list.

A faulty or nonresponding processor left on the poll list degrades OSP performance because of the timeout required before polling the next processor. The operating system removes a faulty processor from the poll list only after a considerable delay. When the system automatically removes a processor from the poll list, an error message appears on the 25th line, indicating that the poll-off has occurred. When powering off a processor, the operator should first remove it from the poll list. If the operator removes the processor, no message appears.

Once a processor is removed from the poll list, no messages from that processor appear at the terminal or hard-copy printer. A special I/O process, called $OSP, that runs in two processors designated at SYSGEN time handles OSP access to the GUARDIAN operating system. If both processors are removed from the poll list, the Command Interpreter no longer communicates with the OSP.

4.5.1.2 F2 (Get New Data)

Unshifted F2 requests that the data collected since the last poll be displayed at the OSP terminal. This screen display is an updated representation at a specific instant and is displayed only by request.

4.5.2 System Status Screen

The System Status Screen identifies each processor on the poll list as either a NonStop II or NonStop TXP processor and displays a summary status report of them all. An operator must switch to the Processor Status Screen to obtain a more detailed status report for a specified processor. Figure 4-2 and the following descriptions explain the data that appears on the System Status Screen.

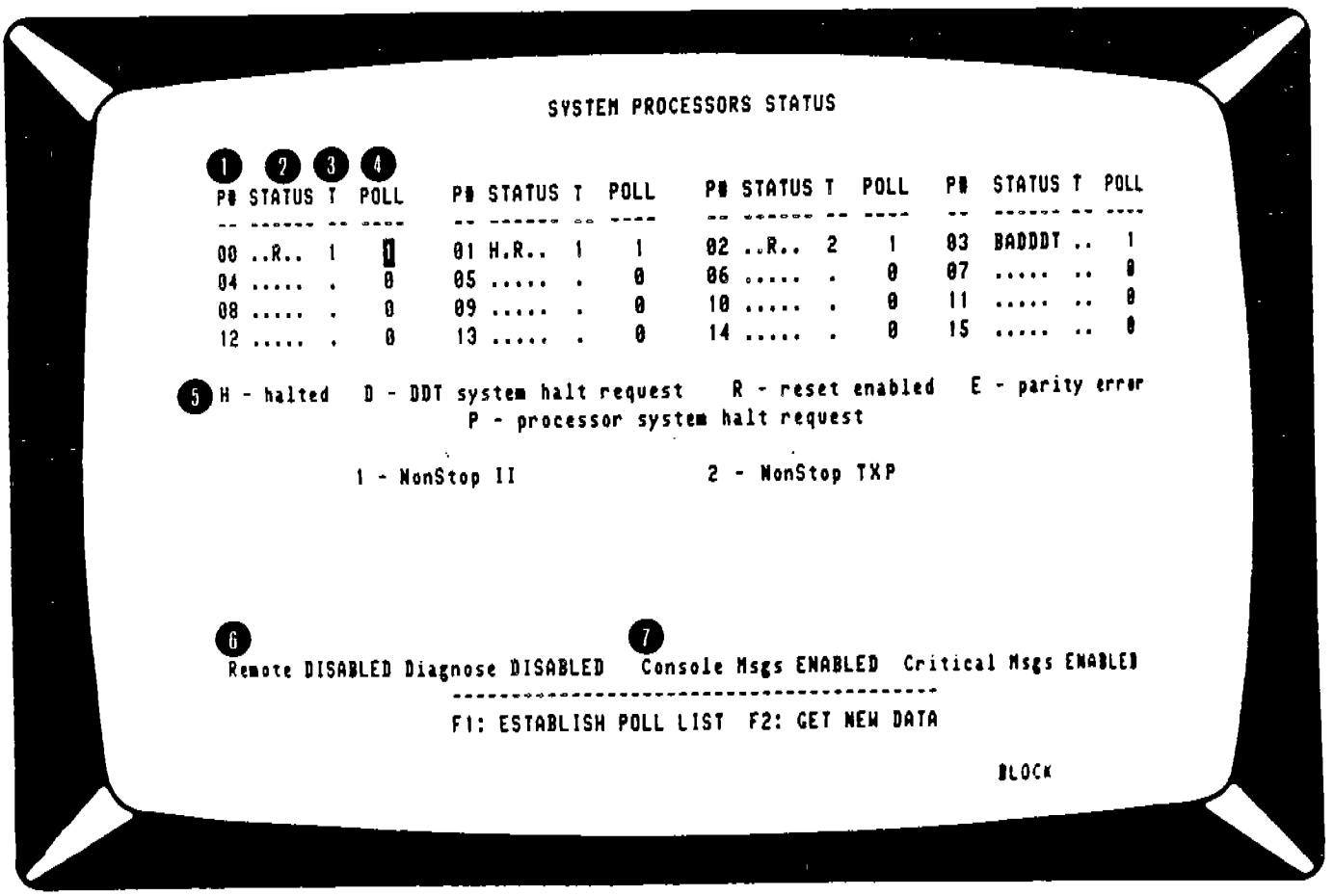

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Figure 4-2 System Status Screen

[1] P#: Processor number in decimal (up to sixteen processors)

[2] STATUS: Field where characters appear to indicate the state of the processor

[3] T: Processor type: 1 = NonStop II
2 = NonStop TXP

[4] POLL: The only unprotected filed on the screen. If set <1>, field indicates that the processor is being polled by the OSP; if <0>, processor not being polled by the OSP. Any other character entered here is invalid.

[5] Processor state: If the associated character appears in the STATUS column, then:

H = the processor is halted

D = a system halt has been requested by the OSP through the DDT

R = the Reset Enabled switch, located on the PMI patch panel, is enabled for this processor

E = a parity error has been detected

P = a processor system halt has been requested by the software for this processor

[6] Remote and Diagnose fields: Fields that reflect the status (enabled or disabled) of the Remote and Diagnose switches on the OSP front panel

[7] Console Messages and Critical Messages fields: Fields that show the status (enabled or disabled) of the Suppress/Enable functions of function keys F3 shifted and F4 shifted respectively

4.6 PROCESSOR STATUS SCREENS (SHIFTED F6)

After pressing the shifted F6 key, the operator can select a particular processor for which the OSP displays, at the terminal, a detailed report of the status. Because the information on this screen is obtained solely from the Diagnostic Data Transceiver (DDT), the selected CPU does not need to be fully functional. Therefore, status of the processor boards can be be obtained without affecting the operation of the processor.

The Processor Status Screen displays the basic processor state: running, idle, or frozen, along with the reasons. Exceptional states are indicated only if they exist at the time the processor status was fetched. Although the NonStop II and NonStop TXP processors share the same basic format, there are some differences in the screen appearances. The NonStop II Processor Status Screen is discussed in paragraph 4.6.2; the comparable NonStop TXP screen is explained in paragraph 4.6.3.

To invoke the Processor Status Screen mode, press the shifted F6 key on the OSP terminal.

4.6.1 Mode-Defined Function Keys

The Processor Status Screen allows the user to select a processor and update the status and to issue the DDT processor control functions for RESET, COLD LOAD, STEP, SYSTEM FREEZE, THAW, HALT, and RUN. In addition, for the NonStop II system only, it permits the determination of the source of a K-register parity freeze. These operations are invoked with the unshifted function keys defined for this mode:

4.6.1.1 F1 (Select Processor)

To select a processor, the operator enters the decimal processor number in the processor number field of the Processor Status Screen and depresses unshifted function key F1. This processor becomes the global processor; that is, it is used in subsequent requests to the shifted F7 and F9 modes.

4.6.1.2 F2 (Update Status)

Unshifted F2 causes the OSP subsystem to obtain the processor status from the DDT and display it at the terminal. Updates to this display are made only after depression of this key; no unsolicited updates occur.

4.6.1.3 F3 (KREG Parity)--NonStop II Systems Only

Unshifted F3 allows the operator to determine the source of a K-register parity error. Pressing the key causes the OSP subsystem to reset the selected processor and read the microcode instruction that caused the freeze, and translates the KREG source field into a mnemonic for display. This operation results in the loss of the current processor state.

4.6.1.4 F10 (Reset)

Unshifted F10 resets the selected processor if the RST-HLT-FRZ Enable switch on the PMI patch panel is in the ENABLE position. This reset operation places the CPU into a Halt Loop. There is a short delay between the time the reset key is hit and the completion of the function.

4.6.1.5 F11 (Load/Dump)

Unshifted F11 is used in installing a new operating system, in reloading a downed processor, and in taking memory dumps.

OSP Cold-load Procedures

a. Choose the processor from which to begin the cold load operation. This must be a processor that is physically connected to a disc drive on which the operating system image is located (refer to the Controllers paragraph in the SYSGEN listing) and one in which the $OSP process resides.

b. Make sure that the RST-HLT-FRZ switch on the PMI patch panel for the selected processor is in the ENABLE position.

c. To be certain that the system is down, display the System Status Screen by pressing the shifted F5 function key. Each processor should show an H, for halted.

d. Enter the Processor Status Screen and select the processor specified in step a.

   In the Switch Register field specify the disc and subvolume (in octal) from which the operating system is to be loaded, as shown in Figure 4-3.

   For example, if the subvolume is SYS05 and if $SYSTEM is connected to controller %11, unit 5, the subchannel number of the system volume would be 115, and all octal digits in this display should be set to 005115.

SWITCH REGISTER
[005115]

Bits	Contents
<0>	0
<1:6>	System subvolume number of the operating system image to be loaded (SYSnn).
<7>	0
<8:15>	Subchannel number of disc (controller and device).

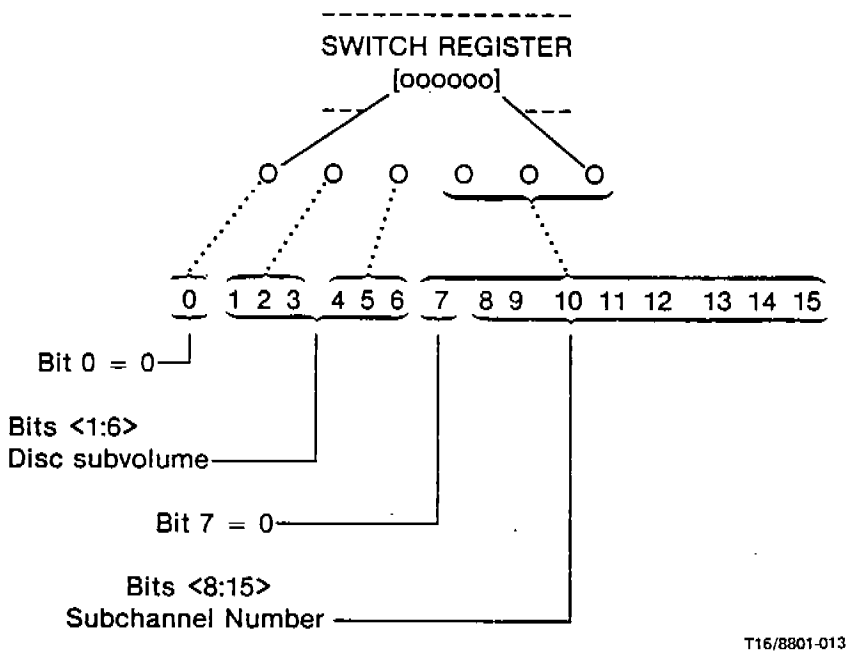

Figure 4-3 Disc and Subvolume Bit Settings

CAUTION

When a system is cold loaded from the OSP, bit 7 in the Switch Register must be set to zero. If switch 7 is on, either logically from the OSP or physically at a processor operator panel, the processor begins to execute a low-level maintenance program called LOBUG (see paragraph 4.8) and freezes. If LOBUG is accidentally invoked with switch 7, type R and press the carriage return to resume the cold load.

e. Press the unshifted F10 function key to reset the processor.

f. Press the unshifted F11 function key to start the tape dump.

g. Press the shifted F1 function key to place the OSP in conversational mode # 1. If the cold load operation was successful, the following message usually appears within a short time (other messages are possible, particularly if there are discs included in the SYSGEN that are not physically present), and the octal value %177777 (all lights on) appears in the front panel lights.

Otherwise, other values appear in the front panel lights, possibly accompanied by an error message on the console.

NOTE

Appendix C describes messages that may appear during cold loading.

If it issues one of these error messages, the system pauses momentarily to display the message on the OSP before a system freeze occurs.

h. Set the date and time of day, using the SETTIME command (Although each processor is loaded in the same manner, the SETTIME command needs to be made only the first time.):

```
:SETTIME {day month} year , hour:minute
         {month day} year , hour:minute
```

i. Use the startup Command Interpreter to load the rest of the processors on the system: load the operating system images into the respective processors over the interprocessor bus, repeating steps j and k for each processor.

j. Enter the Processor Status Screen and select the processor to be loaded.

   1. Transmit the number of the selected processor to the OSP subsystem by pressing the unshifted F1 function key.

   2. Set the octal digits in the Switch Register field to the following octal value to indicate a bus load:

      %100000

   3. Reset the selected processor by pressing the unshifted F10 function key.

   4. To prepare the processor for a bus load, press the unshifted F11 function key.

k. Press shifted F1 to select OSP Conversational Mode # 1, and load the operating image into the processor, using the RELOAD command.

The processor must be halted before memory can be dumped. Dump procedures are described in the following paragraphs.

The dump shows the current contents of:

a. the following registers:

   Interrupt Mask (MASK)
   Stack Pointer (S)
   Program Counter (P)
   Environment Register (ENV)
   Local Data Pointer (L)
   Register Stack (R0-R7)
   Interrupt Register A (INTA)
   Interrupt Register B (INTB)
   Short Segment Table (SST) -- NonStop TXP only
   Extended Base and Limit Registers (XV and XL)
   Scratchpad D Registers (SD)

b. the Memory Map Array (MAP) -- NonStop II only
   the Page Table Cache contents for segments 0-15 -- NonStop TXP only

c. the entire memory of the processor.

A processor can be dumped either directly to magnetic tape or over the interprocessor bus to another processor, which in turn copies the dump to disc.

Taking a Tape Dump with the OSP

a. Mount a tape with a write-enable ring onto a tape drive connected to the processor from which the dump is to be taken. Position the tape at the load point and put the drive on line.

b. Place the switches on the OSP front panel in these positions:

Maintenance key -- MAINTENANCE position
Diagnose switch -- DIAGNOSE position

c. Place the Reset switch on the PMI panel in the ENABLED position.

d. Enter the Processor Status Screen and select the processor that is to be dumped.

e. In the Switch Register field enter the following octal value:

%177400 + tape-subchannel number

Press the unshifted F10 function key.

f. Press the unshifted F11 function key to start the tape dump.

NOTE

An error during a tape dump halts the processor with Scratch-Pad Register SD set to % 177773 or %177774. The type of error is indicated in R7 of the Register Stack. An explanation automatically appears in the current processor state field of the Processor Status Screen.

If a dump halts before it is completed, return to step a and begin the procedure again.

If the processor loops without halting, it is waiting for the tape drive to signal the end of transfer through an input-output (LIO) interrupt. The number of the page that the processor is currently dumping appears in the front panel lights.

Taking a Memory Dump over the Interprocessor Bus from the OSP

This procedure requires a second processor that can access a terminal with a Command Interpreter.

a. Enter the Processor Status Screen and select the specified processor.

b. In the Switch Register field enter the following octal value:

%177777

Press the unshifted F10 function key.

c. Press the unshifted F11 function key to prepare the processor for the bus dump.

d. Press the shifted F1 function key. Log on through a Command Interpreter as a member of the SUPER group and enter:

:RECEIVEDUMP/OUT dumpfile/<cpu #>,<bus #>

This command allows the dump to begin, with an operational CPU reading the dump from the downed CPU <cpu #> over the bus (0 for X-bus, 1 for Y-bus) into the disc file.

The front panel lights display %177777 when the dump is completed. To be sure the dump worked, use the FUP INFO to check the size of the dumpfile. The EOF should not be 0. Refer to the GUARDIAN Operating System Command Language and Utilities Manual (Part Number 82073-D00) for information about the File Utility Program (FUP).

4.6.1.6 F12 (Step)

When the selected processor is in an idle loop or currently halted, unshifted F12 causes one macroinstruction step to be executed by the selected processor.

4.6.1.7 F13 (Freeze)

Unshifted F13 allows the operator to freeze all processors with PMI RST-HLT-FRZ Enable switches enabled. For the processor initiating the system freeze, both DSHRQ (DDT System Halt Request) and SHLT (System Halt) appear on the screen. For any other processor, only the SHLT is indicated.

4.6.1.8 F14 (Thaw)

Unshifted F14 causes all frozen processors to resume execution of macroinstructions starting from the point of the last freeze. The Thaw must be entered from the processor that has the DSHRQ active.

4.6.1.9 F15 (Halt)

Unshifted F15 allows the operator to place a selected processor into the local halt state. LHLT (Local Halt) appears on the screen for that processor.

4.6.1.10 F16 (Run)

Unshifted F16 allows the selected processor to resume execution of macroinstructions starting from the point of the last halt. (The procedure usually is to RELOAD the halted processor rather than use F16.)

4.6.2 NonStop II Processor Status Screens

The Processor Status Screen displays status information on the processor indicated at the top of the screen. The screen for an executing NonStop II system processor on which there are no parity errors or special conditions looks like that in Figure 4-4.

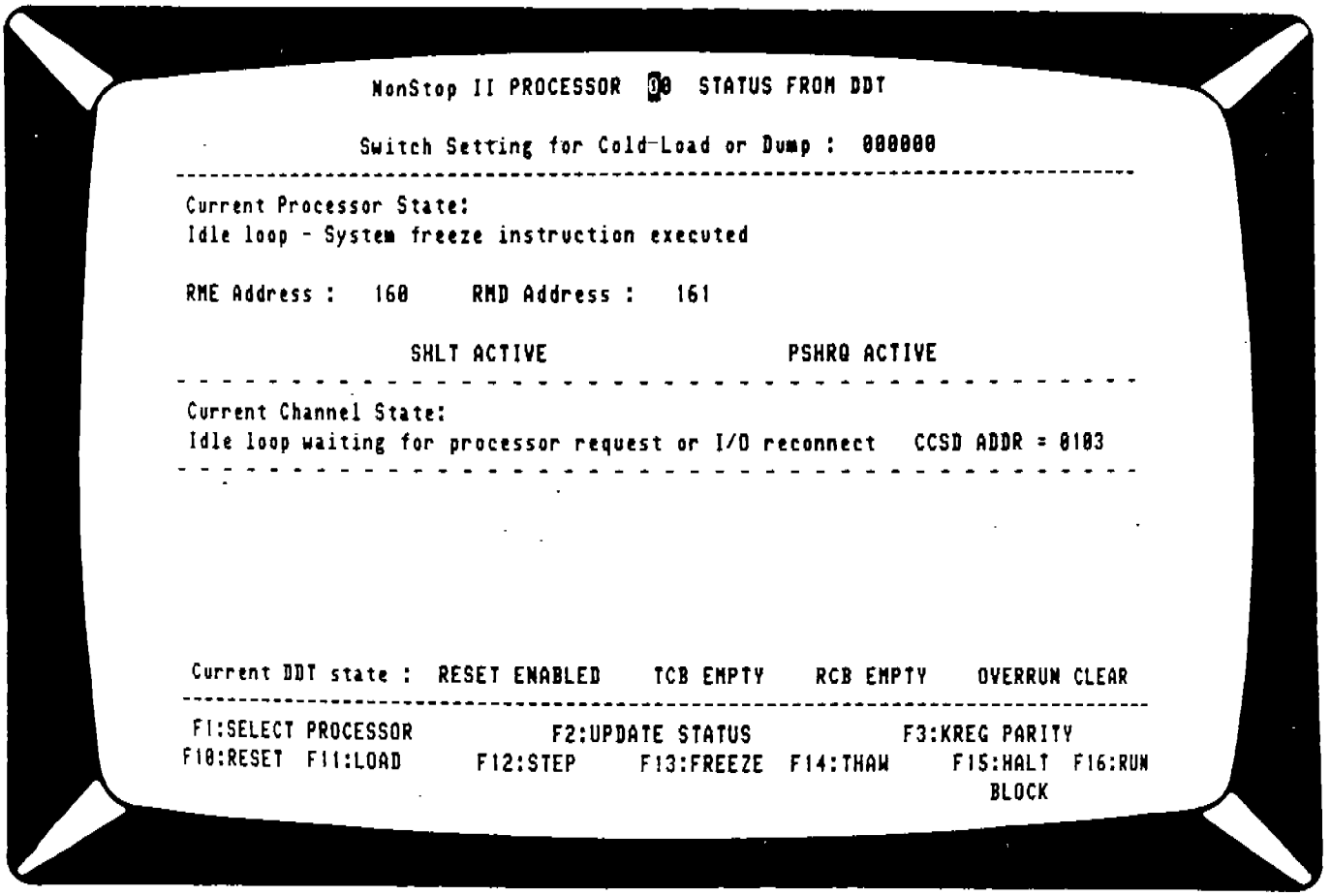

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Figure 4-4 NonStop II Processor Status Screen--A

Figure 4-5 and the following descriptions explain all possible messages that can occur on a NonStop II Processor Status Screen. Noted entries represent conditional states of the processor that are displayed only if the conditional state is true.

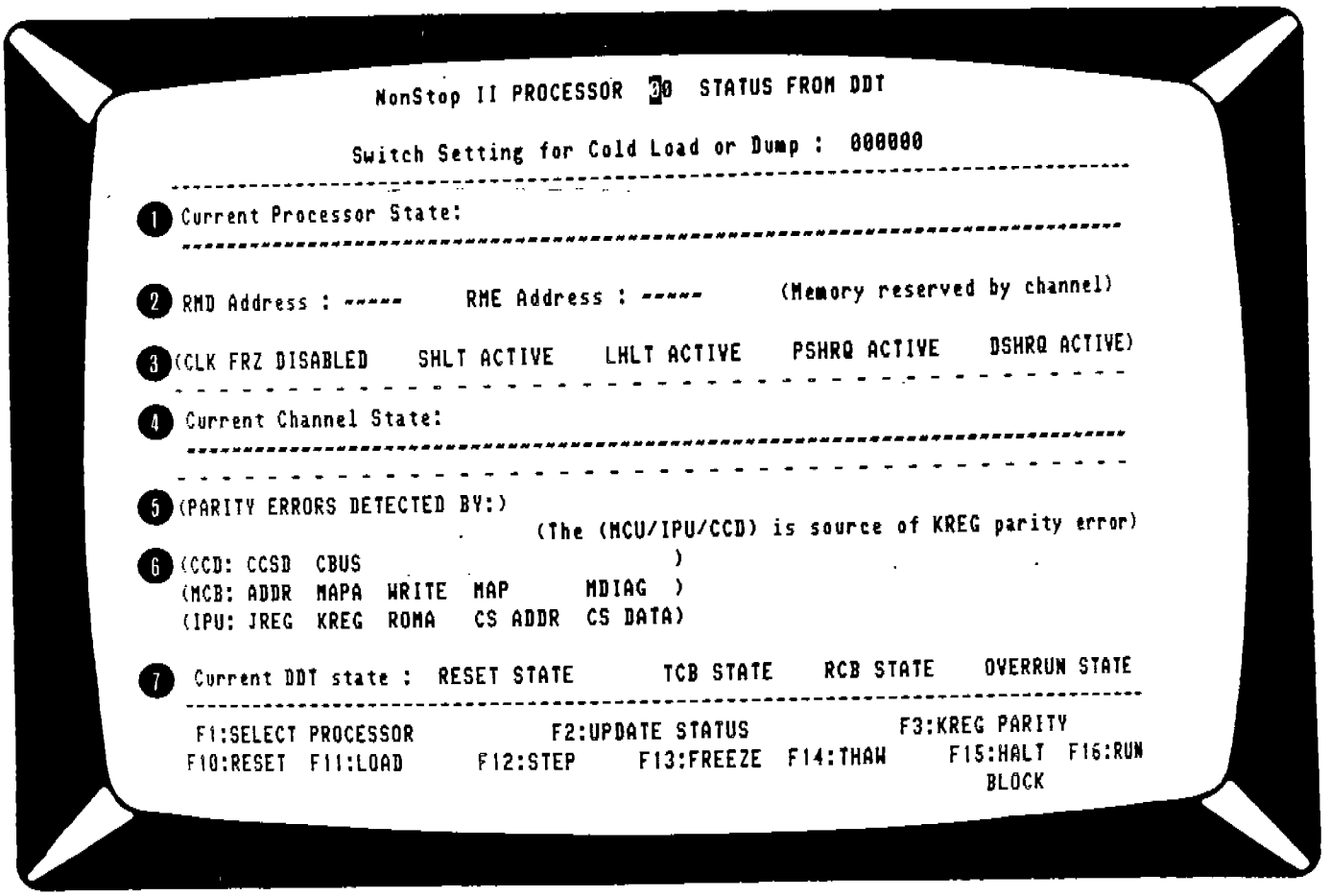

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Figure 4-5 NonStop II Processor Status Screen--B

[1] CURRENT PROCESSOR STATE (conditional)

The following messages can be returned in this field:

a. Executing

b. Idle loop -- Interrupt occurred before LCS loaded

c. Idle loop -- Tape dump attempted - tape drive was not ready

d. Idle loop -- Bus packet sequence error

e. Idle loop -- Manual reset asserted

f. Idle loop -- System freeze instruction executed

g. Idle loop -- Halt instruction executed

h. Idle loop -- DDT halt interrupt asserted

i. Idle loop -- OSP Memory access breakpoint occurred

j. Idle loop -- Local halt interrupt occurred

k. Idle loop -- Bus packet checksum error

l. Idle loop -- Cold load request to channel rejected

m. Idle loop -- Memory dump completed

n. Idle loop -- Power on - memory contents invalid

o. Idle loop -- Dump to 3206 controller with no microcode attempted

p. Idle loop -- Cold load request rejected - invalid switch setting

q. Idle loop - Memory dump to device rejected by channel

r. Idle loop - Memory dump to device failed

s. Idle loop - Unexpected interrupt during memory dump to bus

t. Idle loop - Uncorrectable memory error in loading page table

u. Idle loop - Spurious interrupt - unknown origin

v. Idle loop - returned status %oooooo - unable to decode

NOTE

%oooooo is the octal value of the error code returned from the DDT in the SD register.

w. Clocks frozen - Parity error

x. Clocks frozen - Clocks in single step

y. Clocks frozen - Waiting for channel or memory

[2] CONTROL STORE ADDRESSES

RMD Address: Location of the RMD register that contains the microinstruction read from control store. While in RMD, the microinstruction is partially executed.

RME Address: Location of the RME register that receives the partially executed microinstruction from the RMD register. While in RME, operations on those fields not executed in RMD are performed.

[3] HALT/FREEZE ASSERTIONS (conditional)

CLK FRZ DISABLED: Processor is operating with freeze disabled.

SHLT ACTIVE: DDTHALT asserted and passed to the IPU from the PMI; this indicates that a system freeze has been requested by a processor or the OSP.

LHLT ACTIVE: DDTHALT interrupt asserted and passed to the IPU from the DDT; LHLT places a particular selected processor into the halt loop.

PSHRQ ACTIVE: System freeze request originated within the processor.

DSHRQ ACTIVE: System freeze request originated in the OSP and passed through the DDT.

[4] CURRENT CHANNEL STATE (conditional)

The following messages can be returned in this field.

a. Idle loop waiting for processor request or I/O reconnect
CCSD ADDR = xxxx

b. Frozen - parity error CCSD ADDR = xxxx

c. Waiting to send data to processor CCSD ADDR = xxxx

d. Waiting for data from processor CCSD ADDR = xxxx

e. Executing code CCSD ADDR = xxxx

[5] SOURCE OF PARITY ERROR (conditional)

This field displays the source of a KREG parity error when the unshifted F3 function key is pressed. The format of the message is:

The [MCB (or IPU or CCD)] is the source of KREG parity error.

NOTE

Because determining the cause of the KREG parity error requires that the processor be reset, resulting in the loss of the current processor state, decoding this error is not done automatically, but at the request of the operator, by means of the F3 function key.

[6] PARITY ERRORS (conditional)

This field lists both the points in the processor where parity errors were detected and each board detecting an error. If there are no errors, the entire field is blank. If every board detected all parity errors at once, the parity error field would look as follows:

```
CCD:  CCSD  CBUS
MCB:  ADDR  MAPA  WRITE  MAP      MDIAG
IPU:  JREG  KREG  ROMA   CS ADDR  CS DATA
```

Board	Parity Error	Description
CCD	CCSD	Parity error in the data read from the Channel and Control Store register.
CCD	CBUS	Parity error on the CBUS parity check register.
MCB	ADDR	Parity error in either the PMA or CMA memory address register.
MCB	MAPA	Parity error in one of the map selection registers.
MCB	WRITE	Parity error in either the PMD or CWD write data registers.
MCB	MAP	Parity error in the contents of a map register during either a memory access or map read operation.
MCB	MDIAG	Parity error in the MDIAG register.
IPU	JREG	Parity error detected on the J-bus input to the Arithmetic Logic Unit (ALU).
IPU	KREG	Parity error detected on the K-bus input to the Arithmetic Logic Unit (ALU).
IPU	ROMA	Parity error detected while reading the address of the microinstruction currently in the RMD register.
IPU	CS ADDR	Parity error detected in the control store PROM address.
IPU	CS DATA	Parity error detected in the data read from control store.

[7] CURRENT DDT STATE

This field always displays the state of the DDT flags to verify proper operation of the UART and the state of the reset enable switch on each processor in the system.

RESET STATE: PMI Reset Enable switch is either in Enable or Disable position.

TCB STATE: DDT Transmitter Character Buffer that holds the transmit data to be sent from the DDT to the OSP is either empty and ready to accept another character, or full.

RCB STATE: DDT Receiver Character Buffer that holds the receive data to be sent from the DDT to the IPU is either full with a character available to sent to the IPU, or empty.

OVERRUN STATE: Either clear, or there is an RCB overrun. If the IPU fails to accept an RCB character before the DDT receives the next noncommand character, the character is overwritten and the OVERRUN flag is set. An IPU character acknowledge causes the DDT to clear the OVERRUN, allowing the next character to be loaded into the RCB.

4.6.3 NonStop TXP Processor Status Screens

The Processor Status Screen for a NonStop TXP system processor number [dd] on which there are no parity errors or special conditions looks like that in Figure 4-6.

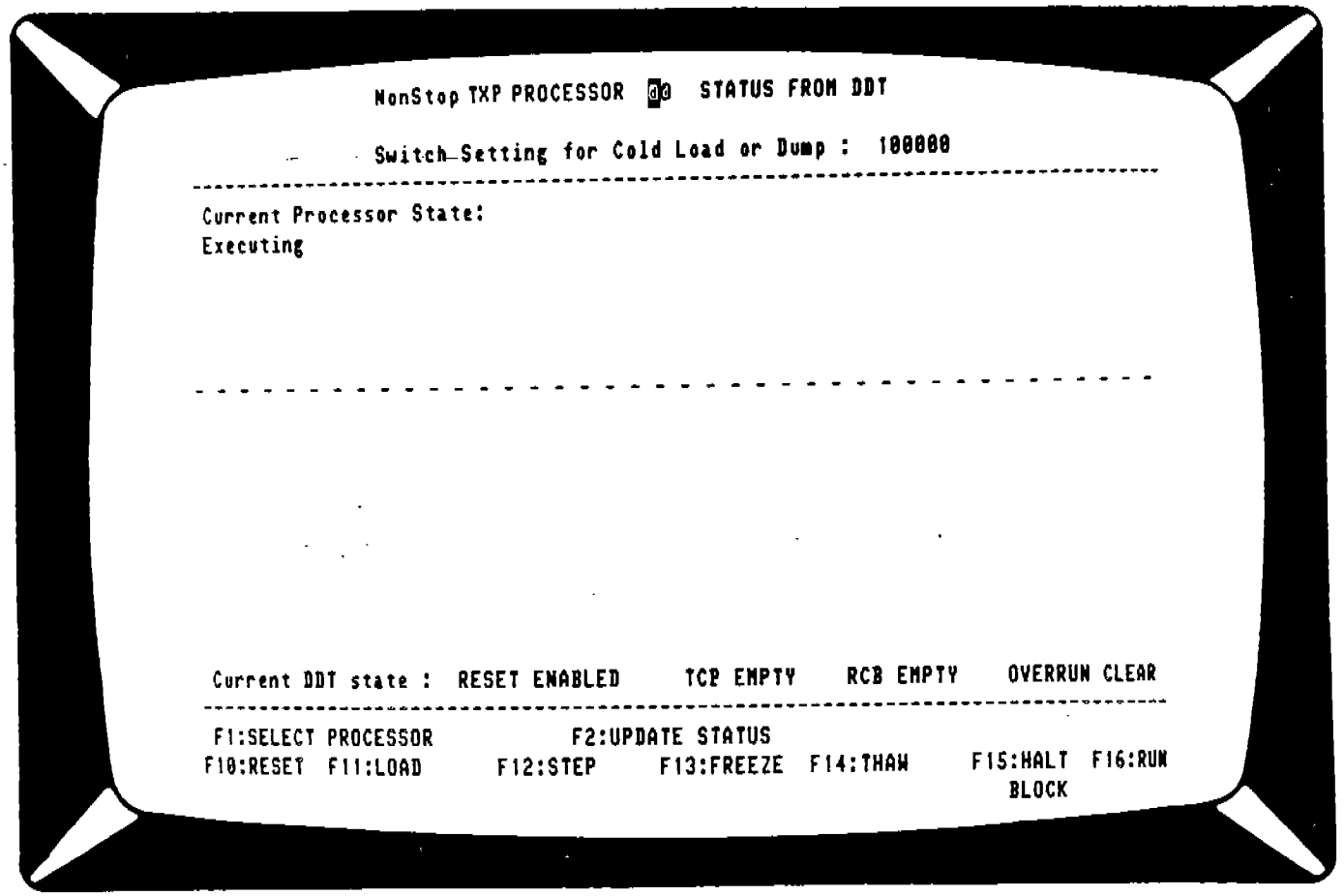

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Figure 4-6 NonStop TXP Processor Status Screen--A

Figure 4-7 and the following descriptions explain all possible messages that can occur on a NonStop TXP Processor Status Screen. Noted entries represent conditional states of the processor that are displayed only if the conditional state is true.

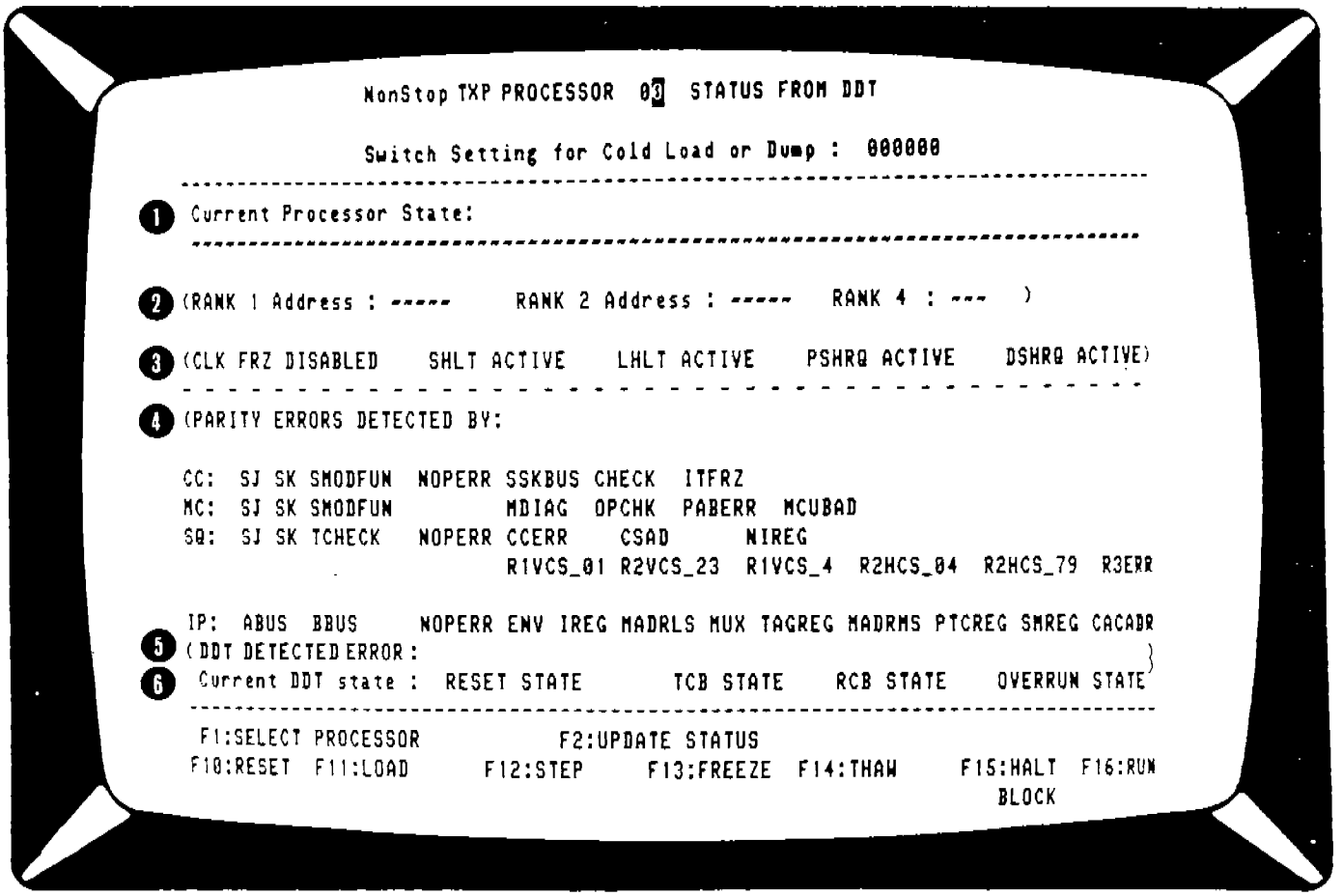

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Figure 4-7 NonStop TXP Processor Status Screen--B

[1] CURRENT PROCESSOR STATE (conditional)

The following messages can be returned in this field:

a. Executing

b. Idle loop -- Interrupt occurred before LCS loaded

c. Idle loop -- Tape dump attempted - tape drive was not ready

d. Idle loop -- Bus packet sequence error

e. Idle loop -- Manual reset asserted

f. Idle loop -- System freeze instruction executed

g. Idle loop -- Halt instruction executed

h. Idle loop -- DDT halt interrupt asserted

i. Idle loop -- OSP Memory access breakpoint occurred

j. Idle loop -- Local halt interrupt occurred

k. Idle loop -- Bus packet checksum error

l. Idle loop -- Memory dump completed

m. Idle loop -- Power on - memory contents invalid

n. Idle loop -- Dump to 3206 controller with no microcode attempted

o. Idle loop -- Cold load request rejected - invalid switch setting

p. Idle loop - Memory dump to device rejected by channel

q. Idle loop - Memory dump to device failed

r. Idle loop - Unexpected interrupt during memory dump to bus

s. Idle loop - Spurious interrupt - unknown origin

t. Idle loop - LCS opcode used before LCS loaded

u. Idle loop - Data page fault - interrupt disabled

v. Idle loop - Code page fault - interrupt disabled

w. Idle loop - Hardware failure, suspect IP or SQ

x. Idle loop - Hardware failure, suspect CC or SQ

y. Idle loop - Hardware failure, suspect MC or SQ

z. Idle loop - Uncorrectable memory error in loading page table at power on

aa. Idle loop - Uncorrectable memory error - interrupt disabled

bb. Idle loop - Error on coldload EIO

cc. Idle loop - returned status %oooooo - unable to decode

NOTE

%oooooo is the octal value of the error code returned from the DDT in the SD register.

dd. Idle loop

NOTE

No message is displayed. The processor is not yet in a state where it is possible to decode the idle loop.

ee. Clocks frozen - Parity error

ff. Memory Dump

gg. Executing Microdiagnostics

[2] RANK ADDRESSES (conditional)

RANK 1 Address: Address of Rank 1

RANK 2 Address: Address of Rank 2

NOTE

Because Rank 1 and Rank 2 addresses are obtained by reading the appropriate scan string, which entails stopping the clocks, the addresses are not displayed when the processor is running; they are displayed only when the processor is halted or frozen.

RANK 4: Displayed only when a SMREG parity error occurs.

[3] HALT/FREEZE ASSERTIONS (conditional)

CLK FRZ DISABLED: Processor is operating with freeze disabled.

SHLT ACTIVE: DDTHALT asserted and passed to the IP from the PMI; this indicates that a system freeze has been requested by a processor or the OSP.

LHLT ACTIVE: DDTHALT interrupt asserted and passed to the IP from the DDT; LHLT places a particular selected processor into the halt loop.

PSHRQ ACTIVE: System freeze request originated within the processor.

DSHRQ ACTIVE: System freeze request originated in the OSP and passed through the DDT.

[4] PARITY ERRORS (conditional)

This field lists both the points in the processor where parity errors were detected and each board detecting an error. It does not attempt to diagnose the source of the error. If there are no errors, the entire field is blank. If every board detected all parity errors at once, the parity error field would look as follows:

```
CC:  SJ  SK  SMODFUN  NOPERR  SSKBUS  CHECK  ITFRZ
MC:  SJ  SK  SMODFUN          MDIAG   OPCHK  PABERR  MCUBAD
SQ:  SJ  SK  TCHECK   NOPERR  CCERR     CSAD      NIREG
                              R1VCS_01  R2VCS_23  R1VCS_4  R2HCS_04
                                                 (cont'd)  R2HCS_79  R3ERR
IP:  ABUS    BBUS     NOPERR  ENV  IREG  MADRLS  MUX  TAGREG  MADRMS
                                        (cont'd)  PTCREG  SMREG  CACADR
```

Board	Parity Error	*Failing Board FRU	Description
* When more than one board FRU has been listed for a specific error condition, the best guess board is listed first with the next best following.			
CC MC SQ CC,MC,SQ	SJ SJ SJ SJ	CC MC SQ IP	Parity error detected on the SJ bus. Each board detecting the error reports a parity error. The SJ bus is contained on the J3 and J4 front edge connector. If this error is detected by all three boards, the IP board is probably generating the error.
CC MC SQ CC,MC,SQ	SK SK SK SK	CC MC SQ IP	Parity error detected on the SK bus. Each board detecting the error reports a parity error. The SK bus is contained on the J4 front edge connector. If this error is detected by all three boards, the IP board is probably generating the error.
CC MC	SMODFUN SMODFUN	CC MC	Parity error detected on the SMODule and SFUNction buses. Each board detecting the error reports a parity error. The buses are contained on the J3 front edge connector. Should this error be caused by a control store error, a R2HCS_79 error also occurs.
CC SQ IP	NOPERR NOPERR NOPERR	CC SQ IP	Parity error detected as a result of testing the NOP and NOP* signals and finding them equivalent. If more than one NOPERR error is reported, replace the SQ board.
IP IP	ABUS BBUS	IP IP SQ	Parity error detected on data being input to the ALU on the IP board. An ABUS error corresponds to the A side of the ALU. These parity errors are usually related to failures local to the IP board; however, BBUS errors can also indicate a bad J2 cable or a bad SQ board.
IP	ENV	IP SQ	Parity error detected on the ENVironment register. This error is probably local to the IP board, but it could also be a bad J1 cable.
IP	IREG	IP	Parity error detected on the Instruction REGister. This error is probably local to the IP board.

Board	Parity Error	Failing Board FRU	Description
IP	MADRLS	IP MC	Parity error detected on the Memory ADdRess Least Significant register. This error is probably local to the IP board.
IP	MUX	IP SQ	Parity error detected by the IP board. The ABUS, BBUS, SJBUS, SKBUS mux selected are sent from the SQ to the IP board along with a parity bit that detected the error. These signals are sent over the J2 front edge connector. R2HCS_04 is also asserted if this an SQ problem.
IP	TAGREG	IP	Parity error detected by the cache TAG REGister. This error is probably local to the IP board and is possibly caused by a TAG store RAM error.
IP	MADRMS	IP	Parity error detected on the Memory ADdRess Most Significant register. This error is probably local to the IP board.
IP	PTCREG	IP	Parity error detected by the Page Table Cache REGister. This error is probably local to the IP board and is possibly caused by a PTC RAM error.

Board	Parity Error	Failing Board FRU	Description
IP	SMREG	(See list)	Parity error detected on the SMBUS. This bus gathers data from the other processor boards. It uses the J3 front edge connector. Faults may be localized by examining the R4REG, which reports the R4 SMOD that placed the data in error on the SMBUS. Should the failing special module not cause the problem, the IP board is the best guess board FRU.

R4 SMOD	Best Guess FRU
%00	CC
%01	CC
%02	MC
%03	MC
%04	MC
%05	MC
%06	SQ
%07	SQ
%10	CC
%11	CC
%12	CC
%13	CC
%14	CC
%15	CC
%16	CC
%17	SQ

IP	CACADR	IP SQ	Parity error detected as the CAC and ADR fields are transmitted from the SQ board to the IP board. If this fault is caused by the SQ board, the R2HCS_79 error also occurs. These signals use the J1 cable.
CC	SSKBUS	IP CC	Parity error detected on the SSKBUS. This is a second copy of part of the SKBUS used by the Scratch Pad registers for addressing. This bus uses the J2 front edge connector.

Board	Parity Error	Failing Board FRU	Description
CC	CHECK	IP CC	This error is caused by an internal microcode self-checking error. The CHECK microoperation found an error condition that caused the freeze. The fault depends on the specific test being performed, but the IP or CC is probably at fault. Recording the R1 and R2 addresses is useful in analyzing the error. This error could also occur because of a bad J2 cable.
CC	ITFRZ	CC	Error detected by the interval timer logic.
MC	MDIAG	MC	Parity error detected on the MDIAG register. This register is a control register used by the processor diagnostics to alter certain processor operations during testing. This register is local to the MC board but is loaded by way of SJBUS data.
MC	OPCHK	MC MM	Error detected as a result of a miscompare between the OPCHK state machine on the MC board and the OPCHK machine on the selected MM board. This indicates a synchronization problem between the Memory Control Unit and the selected Memory Board. This error can be caused by an error in initialization, possibly because of a NOVRAM failure on an MM board. The J1 and J2 cables between the MC and MM should also be checked.
MC	PABERR	IP MC	Parity error detected on the physical address as sent from the IP board to the MC board. This is the physical address to be used by the memory logic for memory access. The physical address is transmitted over the P1 and P2 backplane connectors. If a MADRMS error also appears on the IP, the IP is probably at fault. PABERR can also be caused by improper backplane modifications when installing a TXP in an NonStop II processor cabinet.

Board	Parity Error	Failing Board FRU	Description
MC	MCUBAD	MC	This error is caused by an invalid state detected within the MCU state machines. The error is local to the MC board Memory Control Unit.
SQ	TCHECK	SQ	This error is caused by an internal microcode self-checking error. The TCHECK microoperation found an error condition that caused the freeze. The fault depends on the specific test being performed, but the SQ is probably at fault. Recording the R1 and R2 addresses is useful in analyzing the error.
SQ	CCERR	SQ IP	Error detected in the Condition Code logic as the data flows between the SQ and IP on the J1 front edge connector.
SQ	CSAD	SQ	Error detected in the addressing of control store.
SQ	NIREG	IP SQ	Parity error detected by the SQ board. The SQ contents of the NIREG (next instruction) is sent from the IP to the SQ over the P1 backplane connector. This error can also be caused by a bad cache RAM on the IP.
SQ SQ SQ SQ SQ SQ	R1VCS_01 R2VCS_23 R1VCS_4 R2HCS_04 R2HCS_79 R3ERR	SQ SQ SQ SQ SQ SQ	Parity error detected in control store by the control store parity checkers. As microinstructions are read from control store RAM, the data is checked against stored parity data. This error is local to the SQ board control store section. Any of these errors is likely to cause one or more other errors.

[5] DDT DETECTED ERRORS

This field displays internal processor errors detected by the DDT. Although multiple error conditions may be reported to the OSP, the OSP can display only one error message at a time. The first error reported is displayed; subsequent errors appear on the Processor Status Screen only when preceding errors have been corrected. The following conditions may be displayed in this field:

Failed Board	Error Message	Description
CC	CHECKSUM IN PROM 0	This condition occurs when attempting to access a non-existent PROM (ensure that all PROMs are installed) or when PROM 0 fails.
SQ, CC	MICROCODE LOAD	The DDT timed out while sending data across to the processor. If an error freeze appears, check the SQ board. If there is no error freeze, check the CC board.
SQ, CC	EPT CHECKSUM	The checksum returned to the DDT from the microcode is in error.
CC	CHECKSUM in PROM 3	Bad PROM on the CC board.
CC	CHECKSUM in PROM 4	Bad PROM on the CC board.
CC	UREQ - TCB ERROR UREQ - INCORRECT CMD IN TCB UREQ - UREQ INT WITH UREQ FLAGG OFF	These indicate a CC board problem in the DDT area with the TCB (Transmit Character Buffer).
CC	DDTR/DDTW-UNEXPECTED VALUE IN TCB	Data turnaround test failed.
	DDT TIMED OUT WHILE SCANNING PROCESSOR	Scan counter is not functioning.

Failed Board	Error Message	Description
CC, SQ	CLOCK CONTROL	CSPC did not increment when a clock was issued.
CC	DDT RAM	RAM parity error in DDT RAM.
CC, PMI, OSP	BAD COMMAND FROM OSP	DDT detected an erroneous OSP command.
CC, PMI, OSP	DDT OUTPUT BUFFER OVERFLOW	Processor sent a message that was greater than 1K in length.
CC	UNEXPECTED INTERRUPT CHANNEL 0	CTC channel 0 interrupted when it should not be.
CC	NMI - RAM PARITY NOT ON	When the DDT processed an NMI, the RAMPERR flag was not on. (NMI is used only for RAM parity errors.)
	ERROR FREEZE ON COLD LOAD	Error freeze occurred during HCS load. Check Processor Status screen for parity errors. Run General Processor diagnostics.
MM 0-3	NO MEMORY	DDT did not find a memory board that was scanning.
CC	SCAN PATHS ERROR	Path from DDT to scan strings is unavailable.
CC	SCAN COUNTER ERROR	Counter is not incrementing.
CC	UART TIMEOUT	UART did not work at one point.

Failed Board	Error Message	Description
CC	SCAN STRING CC A	Specified string has failed the scan string test.
CC	SCAN STRING CC B	" "
IP	SCAN STRING IP A	" "
IP	SCAN STRING IP B	" "
MC	SCAN STRING MC A	" "
MC	SCAN STRING MC B	" "
SQ	SCAN STRING SQ A	" "
SQ	SCAN STRING SQ B	" "
SQ	SCAN STRING SQ C	" "
MM 0	SCAN STRING MM 0	" "
MM 1	SCAN STRING MM 1	" "
MM 2	SCAN STRING MM 2	" "
MM 3	SCAN STRING MM 3	" "
	SCAN STRING MM 4	Check backplane modification.
	SCAN STRING MM 5	" "
	SCAN STRING MM 6	" "
	SCAN STRING MM 7	" "
MC	SCAN STRING MC I	Specified string has failed the scan string test.
MC	SCAN STRING MC U	
SQ	NOVRAM CHECKSUM for SQ	Specified NOVRAM has a bad checksum.
IP	NOVRAM CHECKSUM for IP	" "
CC	NOVRAM CHECKSUM for CC	" "
MC	NOVRAM CHECKSUM for MC	" "
MM 0	NOVRAM CHECKSUM/TYPE for MM 0	Specified NOVRAM has a bad checksum or the type field is invalid.
MM 1	NOVRAM CHECKSUM/TYPE for MM 1	" "
MM 2	NOVRAM CHECKSUM/TYPE for MM 2	" "
MM 3	NOVRAM CHECKSUM/TYPE for MM 3	" "
	NOVRAM CHECKSUM/TYPE for MM 4	Check backplane modification.
	NOVRAM CHECKSUM/TYPE for MM 5	" "
	NOVRAM CHECKSUM/TYPE for MM 6	" "
	NOVRAM CHECKSUM/TYPE for MM 7	" "

Failed Board	Error Message	Description
MM 0	STRING SELECTION - MM 0	This board failed the string selection test. More than one board may be responding to this scan string.
MM 1	STRING SELECTION - MM 1	" "
MM 2	STRING SELECTION - MM 2	" "
MM 3	STRING SELECTION - MM 3	" "
	STRING SELECTION - MM 4	Check backplane modification.
	STRING SELECTION - MM 5	" "
	STRING SELECTION - MM 6	" "
	STRING SELECTION - MM 7	" "
MM 0	SERIAL No. for MM 0	Serial Number for this board is incorrect. This may be a bad NOVRAM; more than one board may be responding to scan string.
MM 1	SERIAL No. for MM 1	" "
MM 2	SERIAL No. for MM 2	" "
MM 3	SERIAL No. for MM 3	" "
	SERIAL No. for MM 4	Check backplane modification.
	SERIAL No. for MM 5	" "
	SERIAL No. for MM 6	" "
	SERIAL No. for MM 7	" "
MM 0	NOVRAM COUNT for MM 0	The NOVRAM on the specified board has exceeded the number of times it should be written.
MM 1	NOVRAM COUNT for MM 1	
MM 2	NOVRAM COUNT for MM 2	
MM 3	NOVRAM COUNT for MM 3	" "
	NOVRAM COUNT for MM 4	Check backplane modification.
	NOVRAM COUNT for MM 5	" "
	NOVRAM COUNT for MM 6	" "
	NOVRAM COUNT for MM 7	" "
SQ	NOVRAM WRITE for SQ	DDT tried to write the specified NOVRAM, but the read-back failed.
IP	NOVRAM WRITE for IP	
CC	NOVRAM WRITE for CC	
MC	NOVRAM WRITE for MC	" "
MM 0	NOVRAM WRITE for MM 0	" "
MM 1	NOVRAM WRITE for MM 1	" "
MM 2	NOVRAM WRITE for MM 2	" "
MM 3	NOVRAM WRITE for MM 3	" "
	NOVRAM WRITE for MM 4	Check backplane modification.
	NOVRAM WRITE for MM 5	" "
	NOVRAM WRITE for MM 6	" "
	NOVRAM WRITE for MM 7	" "

[6] CURRENT DDT STATE

This field always displays the state of the DDT flags to verify proper operation of the UART and the state of the reset enable switch on each processor in the system.

RESET STATE: PMI Reset Enable switch is either in Enable or Disable position.

TCB STATE: DDT Transmitter Character Buffer that holds the transmit data to be sent from the DDT to the OSP is either empty and ready to accept another character, or full.

RCB STATE: DDT Receiver Character Buffer that holds the receive data to be sent from the DDT to the IP is either full with a character available to sent to the IP, or empty.

OVERRUN STATE: Either clear, or there is an RCB overrun. If the IP fails to accept an RCB character before the DDT receives the next noncommand character, the character is overwritten and the OVERRUN flag is set. An IP character acknowledge causes the DDT to clear the OVERRUN, allowing the next character to be loaded into the RCB.

4.7 EXECUTE MICRODIAGNOSTICS (SHIFTED F7)

Shifted function key F7 calls up the Microdiagnostic Loader Screen, allowing the operator to select either the General Test or the Memory Diagnostic, and additionally for the NonStop II system, the Loadable Control Store. It is also used to fetch the OSP Disc Download Receiver or OSP Disc Copy Program, which are not true microdiagnostics but employ OSP resources used in running microdiagnostics.

In supporting two processors, the NonStop II and the NonStop TXP, the OSP requires two floppy diskettes, one designated as the NonStop II diskette and the other as the NonStop TXP diskette. While both contain an OSP Operating System and either may boot the OSP system, the two provide different microdiagnostics and corresponding message handlers.

The OSP supports the following three possible configurations:

a. NonStop II only system

b. NonStop TXP only system

c. NonStop II/NonStop TXP mixed system.

The microdiagnostic loader displays the correct menu of diagnostics available, based on the type of the currently selected processor: it displays NonStop II diagnostics if the processor is a NonStop II, and NonStop TXP diagnostics for NonStop TXP processors. The loader obtains all of the diagnostic files and corresponding message handlers for a given processor type on one of the two floppy discs, searching both drives before giving up. If it finds the diagnostics on the first diskette searched, the other diskette is not checked. If no files are found after both drives have been searched, one of the following messages is displayed:

4.7.1 Diagnostic Run Procedures

To run the OSP microdiagnostics, proceed as follows:

a. Set the OSP switches and the PMI switches for the selected processor to the following positions:

   OSP NORMAL/DIAGNOSE to DIAGNOSE
   LOCAL/REMOTE to LOCAL
   LOCKED/MAINTENANCE to MAINTENANCE

   PMI DDT ENABLE to ENABLE
   FREEZE ENABLE to DISABLE
   RESET ENABLE to ENABLE

b. Place the processor to be diagnosed on the poll list on the System Status Screen.

c. Make the processor the currently selected one on the Processor Status Screen.

> **CAUTION**
>
> Before actually downloading the diagnostic, be certain that the processor selected on the Processor Status Screen is indeed the processor to be tested. The diagnostic loads into whatever processor is currently selected on this screen. There is nothing but user precaution to prevent it from loading into a live processor, with results that can be catastrophic to the system.

d. Depress shifted function key F7 to fetch the Microdiagnostic Loader Screen on the OSP. (See Figures 4-8 and 4-9.)

e. Depress the function key whose number corresponds to the number assigned to the desired diagnostic. The message handler loads into the OSP RAM, and the OSP display switches to the Diagnostic Control Screen.

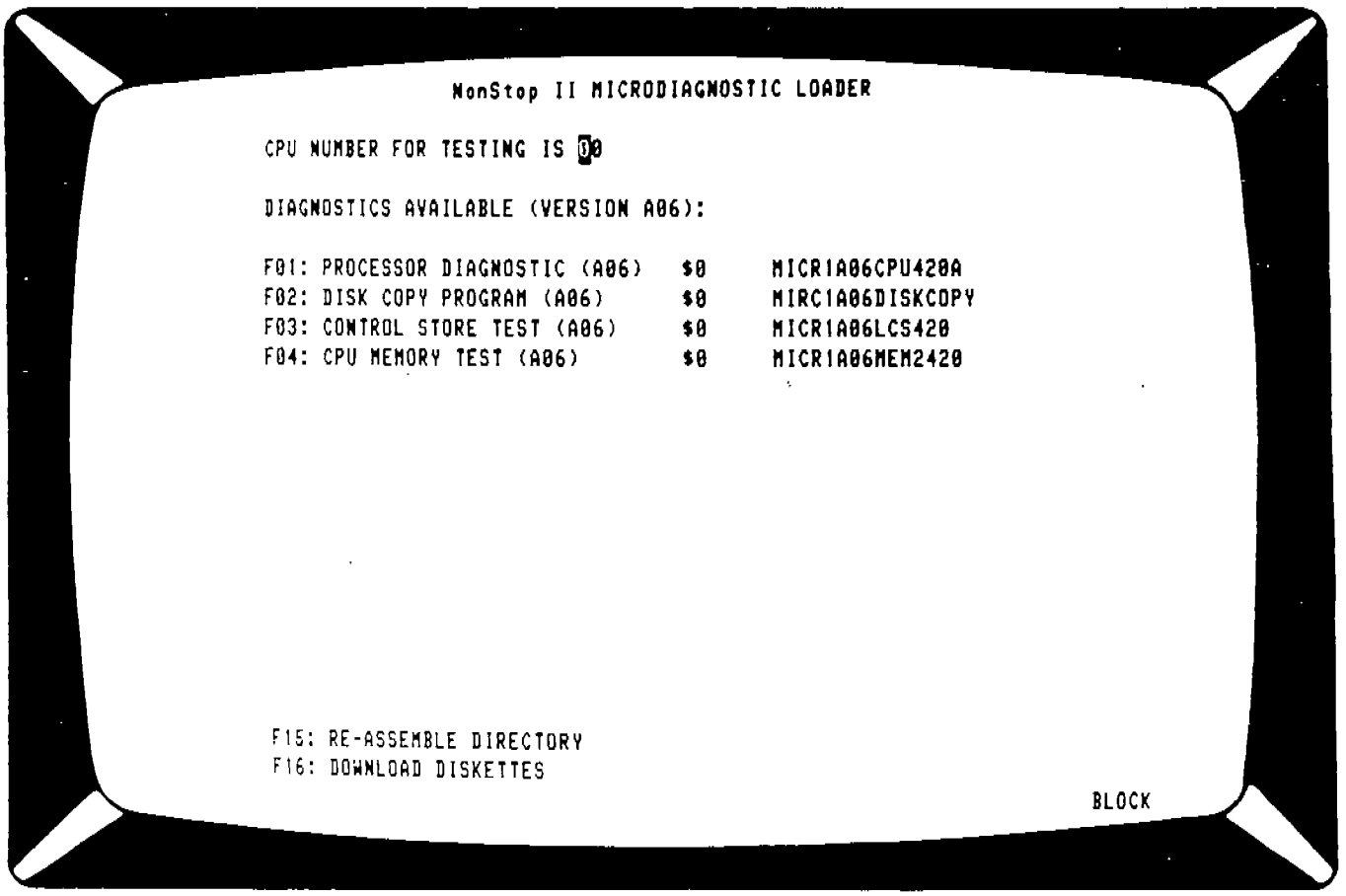
Detailed instructions for running NonStop II diagnostics are given in the following parts of the Diagnostic Operating Procedures Manual, Volume 1, Chapter 1, (Part Number 82803):

a. NonStop II General Test -- Part 6A

b. NonStop II Memory Diagnostic -- Part 6B

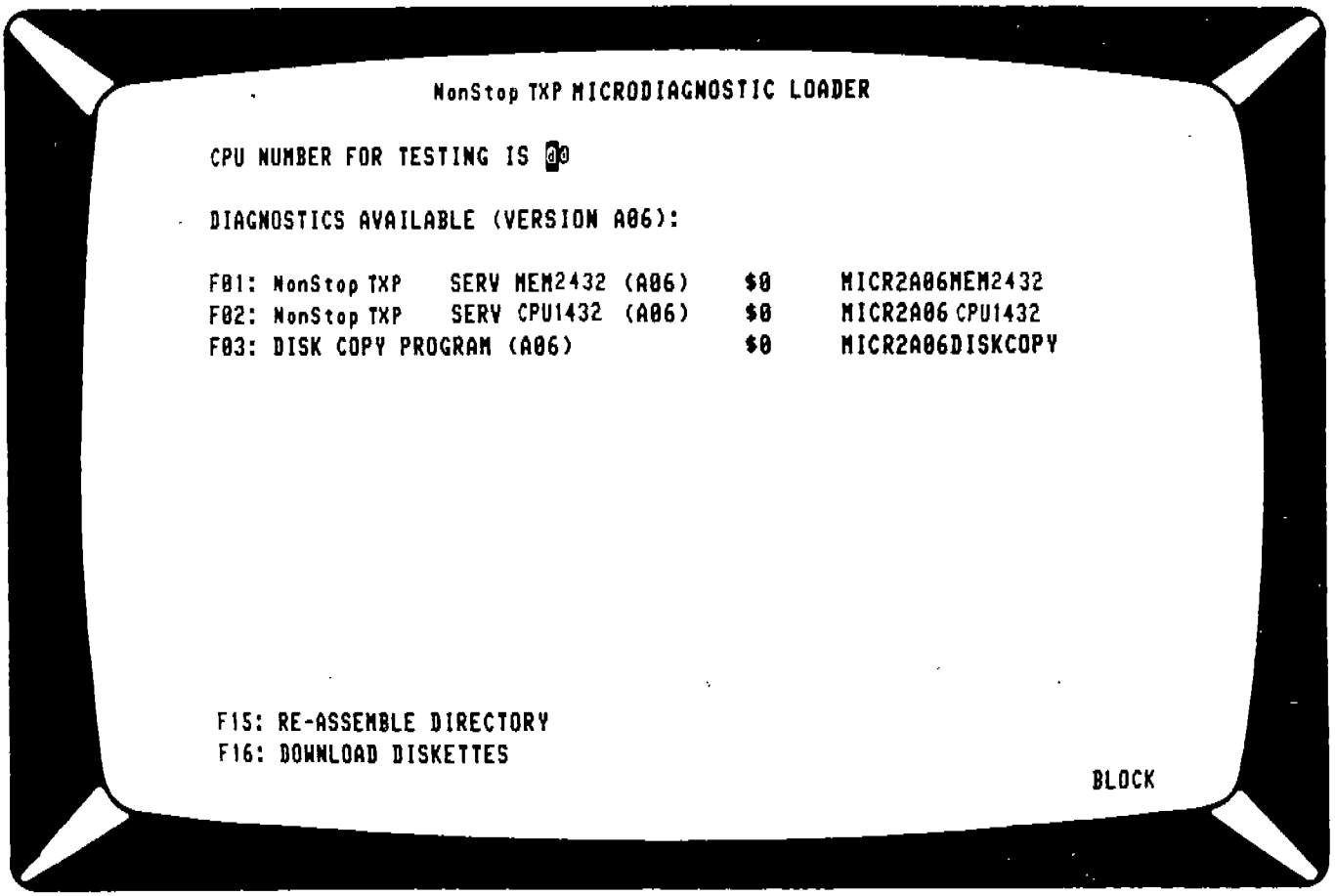
c. NonStop II Loadable Control Store -- Part 6C

Instructions for running the TXP General Test and TXP Memory Diagnostic are given in the NonStop TXP Diagnostic Operating Procedures Manual, Part Number 82804.



T16'8801-019

Figure 4-8 NonStop II Microdiagnostic Loader Screen



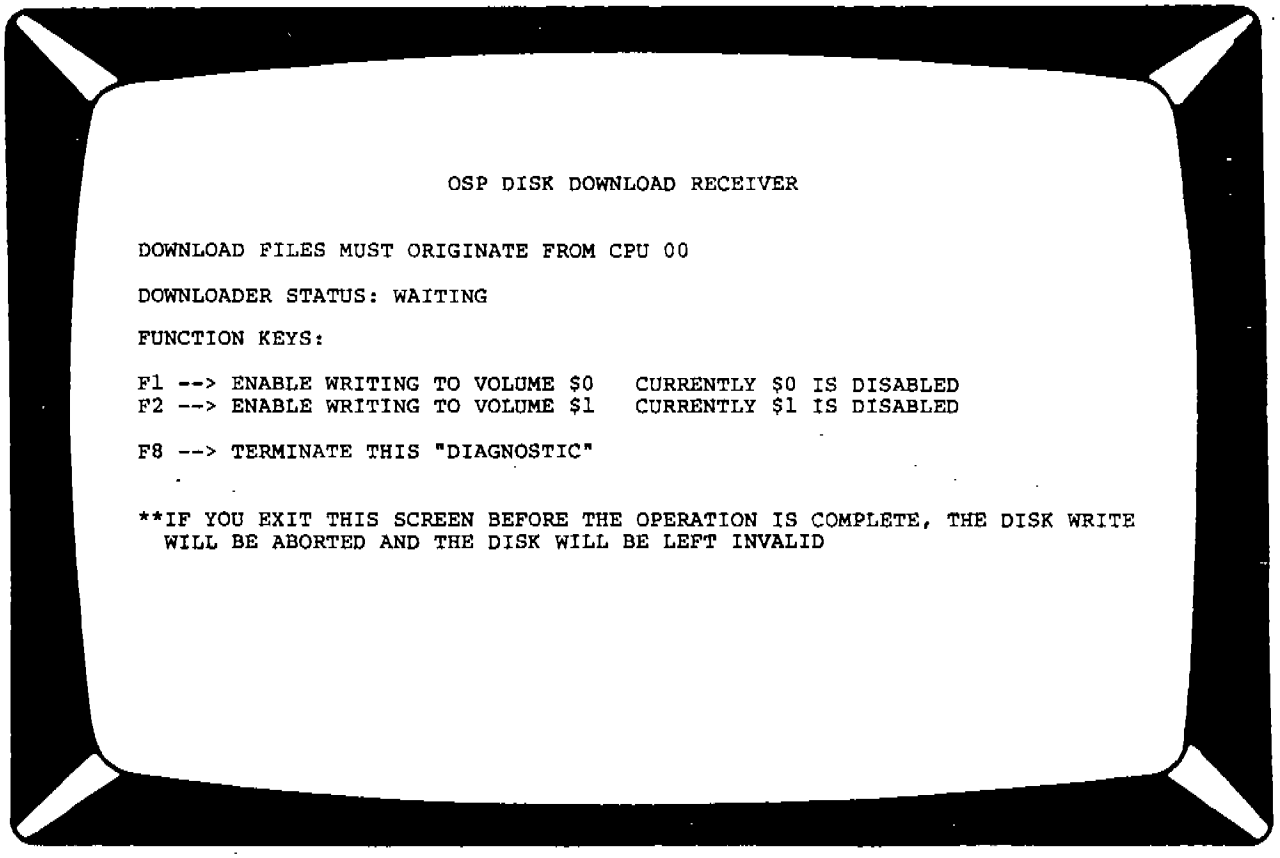
T16/8801-020

Figure 4-9 NonStop TXP Microdiagnostic Loader Screen

4.7.2 OSP Disc Download Receiver

The OSP disc download receiver provides for writing an OSP diskette from CPU disc files. The update operation uses the Tandem-supplied INSTALL program, which automatically performs the required operations until the appropriate time, when the operator is prompted to begin the necessary download operation.

The INSTALL program is described in the Tandem NonStop II System Management Manual, Part Number 82069-F00. The OSP Disk Download Receiver Screen is shown in Figure 4-10.



T16/8801-026

Figure 4-10 OSP Disk Download Receiver Screen

When the INSTALL operation has reached the point where it is ready to create the OSP floppy diskette, the operator is prompted to begin the OSP download with the following steps:

a. Terminate any microdiagnostics that may be running in the OSP.

b. Make the primary processor the currently selected one on the Processor Status Screen.

c. Depress shifted function key F7 to call up the Microdiagnostic Loader Screen.

d. When the microdiagnostic menu appears, depress function key F16 to call up the OSP Disk Download Receiver Screen.

e. Insert the new diskette into either floppy disc drive.

f. Select the drive to which the file is to be written by depressing either function key F1 to select the left-hand drive ($0) or function key F2 to select the right-hand drive ($1). The screen now displays one of the following messages:

```
F1 --> ENABLE WRITING TO VOLUME $0
F2 --> ENABLE WRITING TO VOLUME $1
```

g. The program loads the new files into the designated volume. As each file is loaded, the screen displays:

```
DOWNLOADER STATUS:  WRITING <filename>
```

h. When the last file has been written, the following message is displayed:

```
DOWNLOADER STATUS:  WAITING
```

i. Terminate the download operation by pressing function key F8. The diskette may now be removed from the drive.

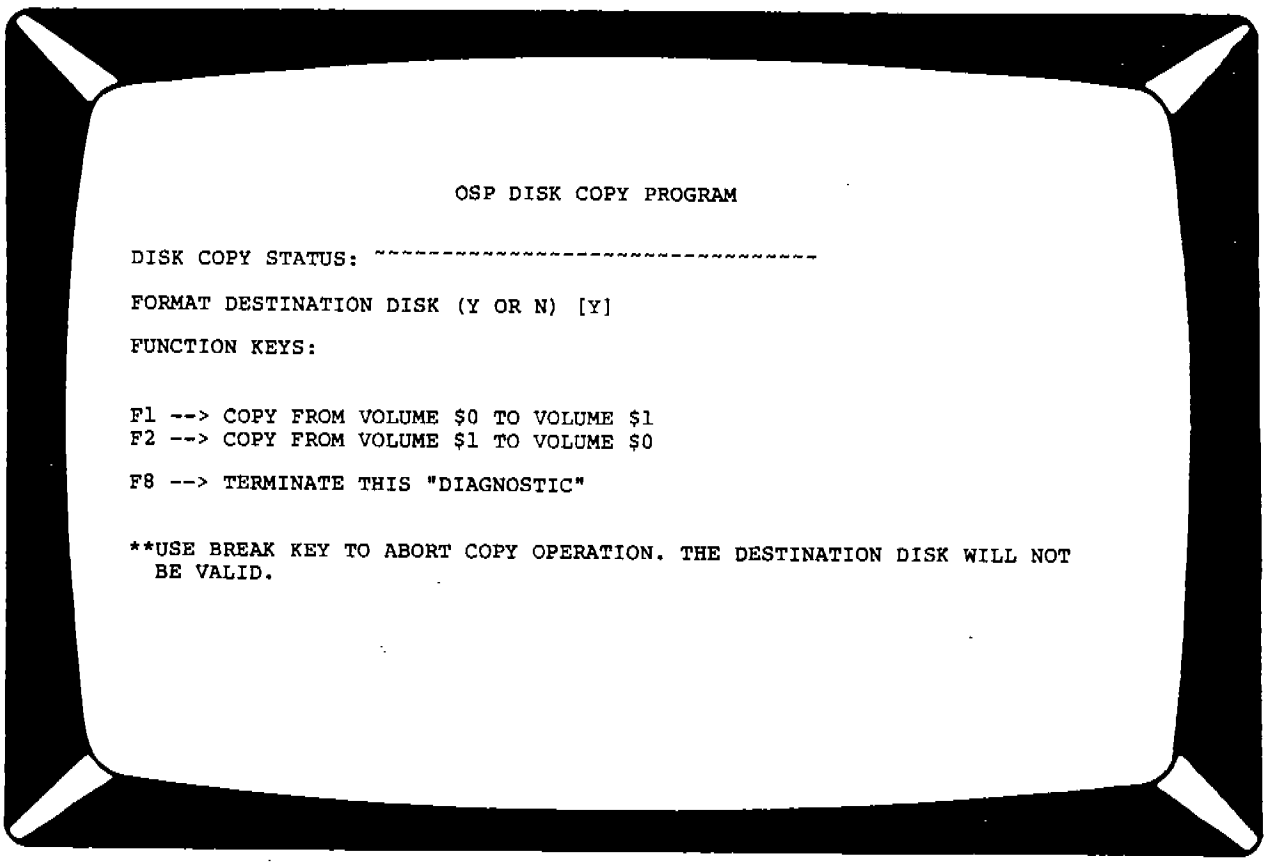
The last two lines of the display are:

```
IF YOU EXIT THIS SCREEN BEFORE THE OPERATION IS COMPLETE, THE DISK
WRITE WILL BE ABORTED AND THE DISK WILL BE INVALID
```

This message means that no action may be taken to cause the removal of the OSP Disk Download Receiver Screen from the terminal that does not also abort the process.

4.7.3 OSP Disc Copy Procedure

The OSP disc copy program makes it possible to copy a diskette in less time than would be required to write a new diskette from CPU disc and allows the operator to write a diskette with code that is not available from CPU files. Figure 4-11 shows the disc copy procedure screen.



T16/8801-027

Figure 4-11 OSP Disk Copy Program Screen

To copy a diskette from a diskette:

a. Terminate any microdiagnostics that may be running in the OSP.

b. Depress function key F7 (shifted) to invoke the Microdiagnostic Loader Screen, and select the OSP disc copy program from the menu.

c. Insert the diskette that is to receive the code into either disc drive; the diskette must be write enabled. Insert the diskette containing the code to be copied into the other drive; the diskette should be write protected.

d. If the destination diskette is not to be formatted, enter N in the field that follows the question:

```
FORMAT DESTINATION DISK (Y OR N)
```

The default value is yes [Y] so that if no entry is made, the diskette is automatically formatted.

e. If the new diskette resides in the left drive (volume $0), depress function key F2 to initiate the copy process. If the new diskette resides in the right drive (volume $1), use function key F1. The screen displays the message:

```
DISK COPY STATUS:  COPYING FROM $_ TO $_
```

where $_ is the appropriate volume, $0 or $1.

f. When the copy operation is complete, the following message appears:

```
DISK COPY STATUS:  WAITING FOR FUNCTION KEY
```

The new diskette may be removed from the drive. If another copy is needed, another diskette may be inserted and steps d and e repeated.

g. Terminate the Disk Copy Procedure by depressing function key F8.

h. Remove the source diskette from the disc drive, and replace the OSP diskette from which the OSP code was booted into the drive in which it was originally located.

4.8 LOBUG (SHIFTED F9)

LOBUG is a low level system debugging tool used primarily by system analysts and internal programmers and also by customer engineers. In this mode, the OSP acts as a conversational system debugger, offering the usual functions of Tandem non-symbolic debuggers, plus appropriate commands to freeze and thaw the system, check DDT status, reset and cold load, access different CPUs, and instruction-step individual processors.

There are two types of memory access and code breakpoints available through the OSP: a standalone breakpoint requiring minimal support from the CPU, and a cooperative breakpoint requiring the support of GUARDIAN.

When the processor encounters either a memory or code breakpoint, it issues a System Freeze command and enters the halt loop. The OSP must be polling the subject CPU to detect the breakpoint. Breakpoints are reported by one of the following messages:

```
COOPERATIVE MEMORY ACCESS BREAKPOINT OCCURRED

COOPERATIVE CODE BREAKPOINT OCCURRED

STANDALONE MEMORY ACCESS BREAKPOINT OCCURRED

STANDALONE CODE BREAKPOINT OCCURRED
```

If the OSP is not currently in LOBUG when a breakpoint occurs, the 25th line reports the breakpoint. Once the operator has taken any desired action during the breakpoint, he releases the System Freeze with a THAW or R command.

The conversational debugger, LOBUG, is entered by pressing shifted function key F9. When it is invoked, a message appears on the terminal:

```
LOBUG  xxxxxx , yyyyyy
```

where:

xxxxxx is the contents of the P register (program counter) in octal,

and:

yyyyyy is the contents of the ENV register (environment register) in octal.

Below the header message, the LOBUG prompt appears:

```
OSP,xx,yy -
```

where:

xx is the CPU number

and:

yy is the PIN number.

To return from LOBUG to the conversational mode or any of the special display modes, the operator presses the appropriate shifted function key.

Only part of LOBUG is loaded during the OSP Operating System boot; part of the LOBUG code is loaded from floppy disc when it is needed. Due to the memory limitations on the old SMP board (Part Number 55700), LOBUG and the microdiagnostics share memory by overlaying into the same memory area when loaded from the diskette. Because of this overlay, the OSP checks to see that no diagnostics are running before loading LOBUG from diskette and allowing LOBUG commands to be executed. Since the new board (Part Number 42540) no longer shares memory space with diagnostics, once LOBUG is loaded it remains resident in memory.

Upon loading, there are two possible responses:

a. Message for SMP P/N 55700:

```
DIAGNOSTICS MUST BE TERMINATED BEFORE USING LOBUG
```

b. Message for SMP P/N 42540:

```
LOADING LOBUG
```

If LOBUG is currently resident, no message is displayed and the user immediately receives the LOBUG prompt.

4.8.1 LOBUG Commands

LOBUG uses the following commands. Where indicated below, the syntax for some of the more complicated ones is given in Appendix E. Debugger commands in general are discussed in the Debug Reference Manual (Part Number 82098-A00).

A	Display Command (ASCII display)
B	Set Breakpoint
C	Clear Breakpoint
CPU	Select CPU (also in block mode)
D	Display Memory Command (octal display)
FREEZE	Freeze the system (also in block mode)
HALT	Halt the processor (also in block mode)
LOAD	Load/Dump processor (also in block mode)
M	Modify Memory Command
MAP	Display/Modify Map (NonStop II only)
N	Step Processor (equivalent to block mode STEP command)
POLL	Display System Status Screen (also in block mode)
POLL OFF	Remove current CPU from poll list
POLL ON	Place current CPU on poll list
PRINT	Clear/Set flag to output all conversational-terminal I/O to optional printer
R	Run CPU (equivalent to block mode RUN or THAW commands)
REG	Display physical registers
RESET	Reset processor (also in block mode)
SPAD	Display scratchpad address (NonStop TXP only)
SST	Display short segment table (NonStop TXP only)
STATUS	Display Processor Status Screen (also in block mode)
SWITCH	Set OSP switch register for current CPU
THAW	Thaw system (also in block mode)
T	Debug Trace
V	Change currently defined data spaces
=	Perform arithmetic calculations
?	Display current debugging environment

4.8.1.1 Displaying Memory/Registers

The A command displays data in ASCII representation; the D command in octal. The syntax for these commands is given in Appendix E.

The command used to display mapped logical memory is DM (mapped). Specification of an address in mapped logical memory requires the map number and the logical address:

{DM} <map number>, <logical address>

The command used to display unmapped physical memory is DU (unmapped) and applies to NonStop II systems only. Specification of an address in unmapped physical memory requires the physical page and the page displacement:

{DU} <page number>, <page displacement>

For information on the memory mapping scheme of the NonStop II system, refer to the "NonStop II System Description Manual," (Part Number 82077-C00).

4.8.1.2 Setting a Breakpoint

There are four ways of setting a breakpoint in LOBUG, two cooperative and two standalone. A cooperative breakpoint requires the cooperation of the processor operating system and is actually set in the processor breakpoint tables. In these cases, the processor notifies the OSP when the breakpoint occurs. Cooperative breakpoints may be either code or memory access breakpoints.

Standalone breakpoints do not require anything of the operating system: LOBUG has breakpoint tables and sets a breakpoint by inserting a breakpoint freeze instruction at the breakpoint address. Standalone breakpoints may also be either code or memory access breakpoints.

Appendix E gives the syntax for all four methods of setting a breakpoint.

4.8.1.3 Clearing a Breakpoint

There are four ways of clearing a breakpoint in LOBUG, two cooperative and two standalone. A cooperative clearing requires the cooperation of the processor operating system, which notifies the OSP when the breakpoint is cleared. Cooperative clearings may be either code or memory access.

Standalone clearings do not require anything of the operating system: LOBUG clears the breakpoint directly. Standalone breakpoint clearings may also be either code or memory access clearings.

Appendix E gives the syntax for all four methods of clearing a breakpoint.

4.8.1.4 Selecting a Processor

In LOBUG, this selection is done by invoking LOBUG and entering the CPU number, in decimal, after the prompt:

```
CPU <dd>
```

4.8.1.5 Reading the Control Panel Switch Register

The status information and error codes that are indicated by the CPU control panel switch register lights are not reported to the switch register field of the Processor Status Screen. They are, however, stored in memory within the processor and may be displayed on the OSP terminal using LOBUG. When the LOBUG prompt appears, type in the following commands:

```
CPU <dd> <cr>

DM1, 122 <cr>
```

LOBUG returns the contents (octal) of System Global location %122, in which the Lights Save information is stored. The octal number may then be decoded according to the appropriate table.

4.8.1.6 Freezing the System

A DSHRQ, which freezes the system, may be issued by invoking LOBUG and entering the command FREEZE after the prompt.

The condition of the system is now equivalent to that which would exist had a FREEZE command been issued from the Processor Status Screen.

4.8.1.7 Halting a Processor

The selected processor may be halted by invoking LOBUG and entering the command HALT after the prompt.

The condition of the system is now equivalent to that which would exist had a LOCAL HALT been issued from the Processor Status Screen.

4.8.1.8 Cold Loading a Processor from Disc Using LOBUG

To cold load a processor from LOBUG, the following steps should be taken.

Prepare the OSP and PMI switches:

a. Set the OSP switches and the PMI switches of the selected processor to the proper positions:

   OSP NORMAL/DIAGNOSE to DIAGNOSE
   LOCAL/REMOTE to appropriate position
   LOCKED/MAINTENANCE to MAINTENANCE

   PMI DDT ENABLE to ENABLE
   FREEZE ENABLE to DISABLE
   RESET ENABLE to ENABLE

b. Put the PMI FREEZE ENABLE switches of all other processors in the DISABLE position.

Select the processor and enable it for polling. Load the switch register and load the processor:

a. Type in the SWITCH command, followed by <expression-16> and a carriage return, after the prompt:

   SWITCH <expression-16>

   where <expression-16> is an octal number representing 16 binary bits, which are allocated as follows:

   1. The subchannel number (octal) of the disc (controller and device) is bits <8:15>.

   2. The system subvolume number is bits <1:6>. Refer to the SYSGEN listing for the number assignment of the system subvolume.

   3. Bits <0> and <7> are zeroes.

b. Type in the command LOAD, followed by a carriage return, after the prompt. On execution of the LOAD command, the system loads the Operating System Image from subvolume SYSxx and creates a start-up Command Interpreter for the OSP.

Upon successful completion of the cold load operation, the message PROCESSOR UP is displayed on the terminal; and the value %177777 is indicated by the control panel switch register lights. Failure to complete the cold load operation results in the display of other codes in the lights, which may be accompanied by a message.

c. Depress function key F1 (shifted) to enter Conversational Mode. The OSP terminal now operates in Conversational Mode #1.

d. Set the date and time-of-day:

```
:SETTIME { <day> <month name> } <year> , <hour>:<minute>
         { <month name> <day> }
```

The selected processor is now running under GUARDIAN; the other processors on the system may now be loaded over the Interprocessor Bus.

4.8.1.9 Modifying Register Contents

The Modify Register Contents (M) command allows for modification of the contents of the following registers:

S, P, ENV, L, I, MASK

R0, R1, R2, R3, R4, R5, R6, R7,

RA, RB, RC, RD, RE, RF, RG, RH

The syntax for the M command is given in Appendix E.

4.8.1.10 Displaying/Modifying Map (NonStop II only)

The MAP command supports the capability to display and modify the entries of the specified map in conversational mode. After entries are modified, the display command must be re-entered in order to view the updated contents.

The syntax of the MAP command is as follows:

{MAP} <map#> [,<page #>, <new value>]

where <map #> is entered in octal in the range of 0-17,
<page #> is entered in octal in the range of 0-77, and
<new value> is a 16 bit octal value.

To display map entries, only the parameter <map #> is required in the MAP command. Modifying a map entry requires all parameters to be entered.

4.8.1.11 Single Stepping a Processor

The selected processor must be put in a halt loop before it can single step. Use the HALT or FREEZE command, as is appropriate, to do this.

To single step a processor, invoke LOBUG and enter the command N after the prompt appears.

The processor executes one macroinstruction, then halts.

4.8.1.12 Displaying the Status of All Processors

The data that was obtained in block mode from the System Status Screen may be displayed in LOBUG by entering the command POLL after the prompt.

4.8.1.13 Adding/Removing Processor from Poll List

The selected processor may be added to the poll list by entering the command POLL ON after the prompt.

The selected processor may be removed from the poll list by entering the command POLL OFF after the prompt.

4.8.1.14 Printing

The flag to output all conversational-terminal I/O to the optional printer may be set with the PRINT ON command; it may be cleared with the PRINT OFF command.

4.8.1.15 Running a Processor or Thawing the System

LOBUG does not have a separate command that differentiates the removal of LOCAL HALT from the removal of SYSTEM HALT. In LOBUG, both LOCAL HALT and SYSTEM HALT are cancelled by the LOBUG R (resume) command. To run a processor or thaw a system, invoke LOBUG and enter the command R after the prompt.

The R command suspends LOBUG, allowing output from the process being debugged or Critical Error Condition Messages to be displayed.

The THAW command performs the same function as the shifted F6 function key on the Processor Status Screen.

4.8.1.16 Displaying Register Contents

The REG command displays the physical hardware registers of the currently selected CPU.

NOTE

> It is important to differentiate the REG command from the D command, which displays the register values to the process being debugged. The two commands may display different values depending on the state of the processor and the process being debugged.

The format for the NonStop II display is shown in Figure F-1, that for the NonStop TXP in Figure F-2, contained in Appendix F.

4.8.1.17 Resetting a Processor

The selected processor may be reset by invoking LOBUG and entering the command RESET after the prompt.

4.8.1.18 Displaying the Scratchpad (NonStop TXP only)

The NonStop TXP scratchpad is a 4K x 16 array of registers. The command for displaying the scratchpad is:

{SPAD} <octal address> [,<count>]

where a valid octal address is in the range 0-%7777, and the count must not exceed 128 decimal.

4.8.1.19 Displaying the Short Segment Table (NonStop TXP only)

The short segment table on a NonStop TXP contains the absolute segment corresponding to each of the sixteen short address spaces. The command SST dumps the entire contents of the table.

4.8.1.20 Displaying Processor Status Information

The status information on the selected processor that was obtained in block mode from the Processor Status Screen may be displayed in LOBUG by entering the command STATUS after the prompt.

4.8.1.21 Displaying Stack Markers

To trace back and display the contents of up to ten stack markers, starting from the current stack marker or a designated stack marker, the T command is used. The form of this command is:

{T} [<address>]

where <address> is an <expression-16> specifying the address, relative to the current code segment, of the third word (L word) of the stack marker where the stack marker traceback is to begin. If omitted, the traceback begins with the current stack marker. Up to ten stack markers may be displayed in one execution of the T command.

T displays the stack traceback in the following form:

```
<address>:   <P Reg>  <E Reg>  <L Reg>          (latest)
    .          .        .        .
    .          .        .        .
    .          .        .        .              (oldest)
```

4.8.1.22 Changing the Currently Defined Data Spaces (V Command)

The V command, in various forms, does the following:

VQA <absolute segment #> -- sets address space to absolute segment number
VQ <segment #> -- sets address space to relative segment number
V <pin #> -- sets address spaces to those of the given process
V -- clears debug virtual
VQ -- clears previous Q segment

4.8.1.23 Computing the Value of an Expression

The equal command = is used to compute the value of an expression. The form of this command is given in Appendix E.

4.8.1.24 Displaying the Current Segment ID

The question command ? displays in octal the segment ID currently in use by LOBUG. If none exists, NONE is displayed.

4.8.2 Error Messages to LOBUG

A command issued to LOBUG that is inconsistent with proper syntax, or with the logical condition of the OSP, PMI, or the CPUs, causes an error message to be displayed on the OSP terminal. The error messages that may appear are explained in Appendix D.

4.9 REMOTE SERVICE (SHIFTED F14)

Shifted F14 allows a remote user to gain control of the local PMI interface when the local OSP has been placed in the Remote Passthrough mode.

This discussion refers to the OSP at the site of the system under test as the "local OSP" and the OSP that services a system over a modem connection as the "remote OSP."

The OSP switches should be set as follows:

NORMAL/DIAGNOSE	--	DIAGNOSE
LOCAL/REMOTE	--	REMOTE
LOCKED/MAINTENANCE	--	MAINTENANCE

The procedure is as follows:

a. Depress shifted F15 at the local OSP to enable the Remote Passthrough mode. The message:

appears on the local OSP.

b. Depress shifted F14 at the remote OSP to enable the Remote Service mode. The message:

appears on the remote OSP.

c. Establish the modem connection between the two OSPs. This connection can be initiated at either end of the line. The local OSP displays the message:

The remote OSP displays the messages:

```
ENTERING OSP PASSTHROUGH MODE
```

and:

```
INITIALIZING POLL LIST
```

After the poll list is initialized, the remote OSP is placed in conversational terminal mode. The remote OSP may now be used exactly as if it were the local OSP. Response time is significantly slower because of the modem link.

When the remote operator has completed operations, he exits the Remote Service mode by depressing shifted F14 at the remote OSP. The local OSP then displays the message:

```
REMOTE PASSTHROUGH MODE HAS BEEN TERMINATED
```

The remote OSP exits, displaying the message:

```
LEAVING OSP PASSTHROUGH MODE
```

followed by:

```
INITIALIZING POLL LIST
```

before returning to conversational terminal mode. The remote OSP is now monitoring its own system.

Remote service should then be terminated by placing the LOCAL/REMOTE switch into the LOCAL position at both OSPs.

NOTE

It is possible to bypass the local OSP entirely by connecting the modem at the local site directly to the origin of the PMI chain at J8 of the rightmost PMI assembly. The data transmission rate is reduced to 300 baud.

4.10 REMOTE PASSTHROUGH (SHIFTED F15)

In the Remote Passthrough mode, the terminal acts solely as a buffer between the PMI and the modem port; it simply passes all commands and responses from a remote user to the PMI interface without interpreting the data.

The OSP at the servicing site is placed into the Remote Service mode, as discussed in paragraph 4.9, replacing the OSP at the local site. The OSP switches should be set as described in paragraph 4.9.

The operator enters and exits the Remote Passthrough mode by depressing the shifted function key F15.

Two error messages can appear on the OSP screen:

REMOTE ACCESS IS NOT ENABLED

An attempt was made to enter the Remote Passthrough mode, but the OSP LOCAL/REMOTE switch was in the LOCAL position or the LOCKED/MAINTENANCE keyswitch was in the LOCKED position.

MODEM FAILURE

The OSP is in the Remote Passthrough mode, but OSP does not sense the Data Ready signal from the modem.

4.11 REMOTE COOPERATIVE (SHIFTED F16)

In the Remote Cooperative Mode, although the local keyboard is locked, the local OSP is the actual controller of all OSP operations; the remote terminal is only the entry point for commands and a remote display of what is locally displayed.

There are two sub-modes of Remote Cooperative operation: a status reporting mode, with the OSP DIAGNOSE switch disabled, and a diagnostic mode, with the OSP DIAGNOSE switch enabled. (The other two OSP switches are set to REMOTE and MAINTENANCE, as in the Remote Service and Remote Passthrough modes.)

The procedure is as follows:

a. Depress shifted F16 to enable Remote Cooperative mode. The following message appears:

```
WAITING FOR MODEM CONNECTION
```

b. Establish the modem connection between the two OSPs.

c. As soon as the connection is made, the message:

```
OSP AVAILABLE IN REMOTE COOPERATIVE MODE (CONVT1)
```

appears on both the local and remote terminals, and the local keyboard is locked. The remote OSP is now in Conversational Terminal # 1. The local attendant sees the displays and data returned by the OSP, but does not see the commands that are entered at the remote terminal.

When the remote operator has completed operations, he exits the Remote Cooperative mode by depressing shifted F16 at the remote OSP. Remote service should then be terminated by placing the LOCAL/REMOTE switch into the LOCAL position.

Two error messages can appear on the OSP screen:

REMOTE ACCESS IS NOT ENABLED

An attempt was made to enter the Remote Cooperative mode, but the OSP LOCAL/REMOTE switch was in the LOCAL position or the LOCKED/MAINTENANCE keyswitch was in the LOCKED position.

MODEM FAILURE

The OSP is in the Remote Cooperative mode, but the OSP does not sense the Data Ready signal from the modem.

SECTION 5
SELF-TEST

5.0 SELF-TEST

The OSP has two levels of self-testing capabilities: the Power-On (PON) Self-Test, which occurs automatically when the OSP is powered on or Reset is asserted, and the Extended Self-Test procedures, which are displayed as a menu and can be selected by the operator. This section describes the PON self-test; the extended test is discussed in the Operations and Service Processor Maintenance Manual, Part Number 82846-B00.

5.1 POWER-ON SELF-TEST

At power-on, or when the OSP RESET switch is toggled, the following tests occur. (Paragraph 3.4 of this manual describes the procedures for beginning operation of the subsystem.)

a. A checksum of the PON PROM is performed.

b. A system control word pattern test is performed.

c. RAM parity generation circuitry is tested.

d. The OSP VDU USART is tested:

    1. The command, Mode 1, Mode 2, and status registers are tested for proper initial values after PON.

    2. A pattern test of the registers is performed.

    3. A read/write and an interrupt test are performed.

e. The RAM is tested:

    1. For earlier NonStop II OSPs,

        a) A RAM read/write test is performed: bit patterns are written to, and read from, every byte of RAM.

        b) A RAM address test is performed: the least significant byte of each memory address is written into its location, read, and checked; the test is repeated for the most significant byte.

2. For later NonStop II and all NonStop TXP OSPs,

   a) The RAM is tested using the Knaizuk Hartmann quick verify algorithm.

   b) The Address Mapper is tested.

f. The DDT, power supply monitor, modem, and printer USARTs are tested.

g. The floppy disc controller is tested: the sector, data, and track registers are tested for the ability to hold a data pattern.

h. The interval timer is tested: each of three counter/registers is tested for the ability to hold data patterns, and each counter is tested for the ability to generate interrupts.

i. A test of the OSP coldload functions is performed: the controller is tested for the ability to generate an interrupt upon completion, and the disc drive operations are tested by accessing the Level 1 Bootstrap.

If the tests are successful, the OSP OK and OSP RUN indicators on the module panel are lit. If the test detects an error, these indicators do not light, and failures are reported in two ways:

a. Appropriate LED indicators on the SMP board light. The code for these lights may be interpreted with Table 5.1.

b. An error message is displayed at the terminal indicating the sources of the error. These messages are discussed in paragraph 5.2.

After the self-tests have been completed, The PON software will give control to the Extended Self-Test PROM or will perform Level 0 Boot, depending on the position of the REMOTE and DIAGNOSE switches. If the position of the switches calls for loading the OSP Operating System and the diskette has not been placed into either disc drive, a message appears on the screen indicating so. As soon as a disc is loaded, Level 1 Boot will automatically start.

Table 5.1 OSP LED Error Code

CODE	ERROR DESCRIPTION
0	Proper execution of instruction is not occurring.
1	Checksum of first PROM failed.
2	System control register not zero after reset.
3	System control word failed pattern test.
4	Unused interrupt 4 occurred.
5	RAM parity generation circuitry failed to generate an interrupt.
6	RAM parity detection circuitry failed to set parity error bit.
7	Unused interrupt 7 occurred.
8	Parity error bit in the control word cannot be cleared.
9	OSP VDU USART failed (or other cause of inability to communicate with OSP terminal).
10	All tests that can be reported by LED indicators have been passed. Other errors may be reported as messages on the OSP screen.

5.2 POWER-ON PROM MESSAGES

The messages that can appear on the OSP screen are described in the following two paragraphs.

5.2.1 Power-On PROM Welcome Messages

Approximately five seconds after the OSP is powered on or reset, one of these two messages should appear:

a. For earlier NonStop II OSPs:

```
OSP POWER ON SELF-TEST - T9929A00-01DEC81
```

b. For later NonStop II and all NonStop TXP OSPs:

```
OSP Power On Self-Test - 42550 B00
```

If such a message does not appear, it may be inferred that there is a fault in the communication path from the OSP to the terminal. This fault must be corrected before proceeding.

5.2.2 Error Messages to OSP Terminal

The error messages that a faulty OSP can display at power-on or reset are listed in Figure 5-1.

```
TIMER DATA ERROR

TIMER INTERRUPT ERROR

DISK CONTROLLER FAILURE

MODEM       U11-B     USART FAILURE

PRINTER     U13-B     USART FAILURE

DDT         U9-B      USART FAILURE

PSM         U10-B     USART FAILURE

*RAM DATA ERROR        SHOULD BE XX      IS YY AT ZZZZ   CHIP CCC
*RAM PARITY ERROR      SHOULD BE XX      IS YY AT ZZZZ   CHIP CCC
*RAM ADDRESS ERROR     SHOULD BE XXXX    IS YYYY

**RAM ERROR, DATA IS XX, SHOULD BE YY, MAP=M, ADDRESS=ZZZZ, CHIP=C-CCC
**RAM PARITY ERROR, DATA IS XX, SHOULD BE YY, MAP=M, ADDRESS=ZZZZ,CHIP=C-CCC
**RAM MAPPER ERROR, DATA IS XX, SHOULD BE YY, MAP=M, PAGE=P (or -P)

  LEVEL 0 BOOT FAILED - DISK (STATUS)  TRACK (#)  SECTOR (#)
```

T16/BB01-030

* Messages on previous NonStop II OSPs
** Messages on later NonStop II and all NonStop TXP OSPs

Figure 5-1 SMP Error Messages to OSP Screen

Most of the error messages are self-explanatory; the exception is LEVEL 0 BOOT FAILED - DISK (STATUS) TRACK (#) SECTOR (#).

The Level 0 Boot attempts to read Track 0, Sectors 1 through 9 (Track 0 is the first track; Sector 1 is the first sector). The Status field of the message is two hex digits representing eight status bits, coded according to the following scheme:

Bits	7 6 5 4	3 2 1 0
Hex digit	Most Significant	Least Significant

The Status code reported by the PON PROM floppy disc test may be decoded using Table 5.2. For the PON PROM error message, the command is always READ SECTOR, which is a type II command.

Table 5.2 Status Bits for Type II Command

MESSAGE	EXPLANATION
7 NOT READY	Drive is not ready.
6 WRITE PROTECT	N/A
5 RECORD TYPE	1 = Deleted Data Mark; 0 = Data Mark.
4 RECORD NOT FOUND	If the bit is set, the track, sector, or side was not found.
3 CRC ERROR	If bit 4 is set, an error was found in one or more ID fields; otherwise, it indicates an error in the data field.
2 LOST DATA	If the bit is set, the computer did not respond to a Data Request in one byte time.
1 DATA REQUEST	If the bit is set, the DR was full on a read operation.
0 BUSY	If the bit is set, a command is being executed or the drive is otherwise inaccessible.

APPENDIX A
OSP ERROR AND STATUS MESSAGES

A.0 OSP ERROR AND STATUS MESSAGES

This appendix describes the error and status messages sent to the OSP terminal for the following:

a. Conversational Terminal # 1 Mode (Shifted F1)

b. Operator Console Messages Mode (Shifted F3)

c. Critical Error Messages Mode (Shifted F4)

d. System Status Screen Mode (Shifted F5)

e. OSP Startup Diagnostic Errors

CAN'T STEP, HALT STATUS UNKNOWN

An attempt has been made to single-step the selected processor, but the OSP cannot determine the reason that the IPU entered a halt loop. The operator must resolve the ambiguity by entering the appropriate command, HALT or FREEZE; he may then single-step the processor.

COMMAND NOT ACKNOWLEDGED BY IPU

There is no response to a command directed to the selected IPU. The command type could include Modify Registers, Modify MAP, or LOAD, for instance.

COMMAND NOT ENABLED AT PMI

An attempt was made to exercise one of the processor control functions LHLT, FREEZE, or RESET, but the RESET ENABLE switch of the PMI associated with the selected processor is in the DISABLE position.

CONSOLE MSGS DISABLED

Console (system) messages are not displayed on the terminal.

CONSOLE MSGS ENABLED

Console (system) messages are displayed on the terminal in conversational mode.

COPY COMPLETED SUCCESSFULLY

No errors were detected, or detected errors were successfully corrected during a DISK COPY operation.

COPY TERMINATED BY BREAK -- DESTINATION DISK IS INVALID

Displayed when the DISKCOPY operation has been terminated with the BREAK key before completion.

CPU DID NOT ENTER HALT LOOP

The processor did not respond properly to a HALT or FREEZE command.

CPU NOT BEING POLLED

Polling has not been enabled via the SYSTEM PROCESSORS Status Screen for the selected processor. Some OSP operations and the microdiagnostics require that the selected processor be polled.

CPU NUMBER DOES NOT MATCH $OSP OWNER

The correct processor has not been selected (occurs on entry to the Download Diskette Screen).

CRITICAL MSGS DISABLED

Critical error condition messages are not displayed on the terminal.

CRITICAL MSGS ENABLED

Critical error condition messages are displayed on the terminal in conversational mode and are flagged on the 25th line in block mode.

CRITICAL SYSTEM ERROR DETECTED

This message is the 25th line flag, indicating that a critical error condition message has been received while the terminal is in block mode. The message is displayed on the OSP terminal on return to conversational mode (shifted F1).

DDT FAILED: CPU REMOVED FROM POLL LIST

The DDT has failed to respond to an OSP message twenty times in succession; the CPU has been removed from the Poll List.

DDT FAILED ON LAST TRANSMISSION

There is no response to a command directed to a selected DDT.

DIAGNOSTIC MODE REQUIRED

An attempt was made to exercise a processor control function, but the OSP DIAGNOSE switch was in the DISABLE position or the LOCKED/MAINTENANCE switch was in the LOCKED position.

DIAGNOSTIC SYNCHRONIZATION LOST - REINITIALIZE

The microdiagnostic message handler associated with the microdiagnostic that was loaded from floppy disc has lost control of the microdiagnostic process; the selected microdiagnostic must be reinitialized.

DIAGNOSTICS MUST BE TERMINATED BEFORE USING LOBUG

This message is displayed when a user attempts to enter LOBUG (shifted F9) while diagnostics are executing. This error message is displayed only on those OSPs with limited memory where LOBUG and the diagnostics share an overlay area. It does not occur on OSPs with additional memory capacity.

DISK DIRECTORY READ ERROR

The OSP floppy disc directory has data errors, or a properly formatted diskette has not been inserted in the disc drive.

DISK FILE READ ERROR

A disc error has occurred during an attempt to read a file. If a retry of the operation fails, the floppy disc must be regenerated.

DISK FORMAT FAILED

Formatting operation failed during a DISK COPY operation.

DISK READ FAILED

The read operation failed during a DISK COPY operation.

DISK SELECT FAILED

The select operation failed during a DISK COPY operation.

DISK WRITE FAILED

The write operation failed during a DISK COPY operation.

ENTERING REMOTE SERVICE MODE

Message that appears when the OSP enters the REMOTE SERVICE mode (shifted F14).

ERROR ON DISK FILE OPEN

An error has occurred when the OSP attempts to open a floppy disc file.

FAILED TO OBTAIN REGISTERS FROM IPU

The selected processor did not return the contents of the registers when commanded to do so by the OSP. The IPU microcode or the OSP/IPU communication path is not functioning properly.

F1 TO CHANGE PROCESSORS

A new processor number was entered into the processor number field of the Processor Status Screen, but function key F1 was not depressed to transmit the new processor number.

INCOMPATIBLE CODE FILE FORMAT OR DATA

The microdiagnostic is not the version compatible with the OSP operating system, or the files have data errors.

INCORRECT VERSION NUMBER IN FILE: SHOULD BE Axx

Message displayed when the operator attempts to load a version of LOBUG or diagnostics that are not the same version as the currently running OSP operating system. <xx> is the number of the current release.

INVALID CPU NUMBER

An attempt was made to enter a value other than 0-15 into the processor number field of the Processor Status DDT Screen.

INVALID DATA ENTERED

Data entered in the operator entry fields is not in acceptable format for the routine that is handling the screen.

INVALID LOAD SWITCHES

An attempt was made to enter a non-octal value or an octal value greater than %177777 into the SWITCH REGISTER field during a LOAD operation.

INVALID POLL ENTRY

A character other than "1" or "0" has been entered in the Poll field of the SYSTEM PROCESSORS Status Screen.

LEAVING REMOTE SERVICE MODE

Message that appears when the OSP exits the REMOTE SERVICE mode (shifted F14).

MAP READ FAILED

The OSP could not obtain the MAP contents from the IPU.

MAP WRITE FAILED

The OSP could not write a MAP value into the IPU.

MODEM FAILURE

Displayed when the OSP detects that the modem connection has failed or been broken.

MODEM OPERATIONAL

Displayed on the 25th line when a modem connection has successfully been made.

NO NONSTOP II PROCESSOR DIAGNOSTIC FILES FOUND
NO NONSTOP TXP PROCESSOR DIAGNOSTIC FILES FOUND

The OSP cannot find processor microdiagnostic files in the floppy disc directories.

NO KREG PARITY ERROR (NonStop II only)

An attempt was made to use function key F3 (Processor Status Screen) to determine the cause of a KREG parity error, but there was no KREG parity error and the keystroke was ignored.

OSP AVAILABLE IN REMOTE COOP MODE (CONVT1)

Appears when OSP has been placed in the REMOTE COOPERATIVE mode.

OSP PRINTER FAILURE

This message is displayed at power-on if the OSP is unable to determine the printer type. The printer may not be powered on; it may be offline; the printer-OSP cable may be the wrong type or incorrectly connected; or the printer internal option switches may be incorrectly set.

OSP PRINTER FAILURE -- BAD STATUS RECEIVED

The OSP received invalid status or identification from the printer. Several tries are made before the message is displayed.

OSP PRINTER FAILURE -- BUFFER TOO LONG

The printer will not clear the BUFFER FULL status bit. There is a problem in the printer or a problem in receiving printer status.

OSP PRINTER FAILURE -- NO STATUS RECEIVED

The OSP did not receive status from the printer. The possible causes are the same as are listed under the message OSP PRINTER FAILURE.

OSP PRINTER FAILURE -- OFFLINE

The printer is offline. Bring it online by depressing the ONLINE or select button.

OSP PRINTER FAILURE -- PAPER OUT

The printer is out of paper.

OSP PRINTER FAILURE -- PREVIOUS I/O NOT COMPLETED

The OSP has attempted to write to the printer before the previous write has completed.

OSP PRINTER FAILURE -- TIMEOUT

A line took more than five seconds to be transmitted to the printer. The OSP printer USART may be faulty.

OSP PRINTER FAILURE -- WRITE FAILED

A write to the printer has failed.

OSP REMOTE COOP MODE HAS TERMINATED

Appears when OSP has exited the REMOTE COOPERATIVE mode.

OSP TERMINAL FAILED

Message displayed on the optional OSP printer when the OSP detects that the terminal has failed.

PARITY ERROR HAS FROZEN PROCESSOR

An internal parity error has frozen the selected processor. Refer to the Processor Status Screen.

PROCESSOR ASSERTED SYSTEM FREEZE

The selected processor has asserted PSHRQ.

PROCESSOR IS NOT IN HALT LOOP

An operation has been attempted that requires that the selected processor be in a HALT LOOP, but the processor is not in a HALT LOOP.

REMOTE ACCESS IS NOT ENABLED

Message displayed when the operator attempts to enter any of the remote operation features of the OSP while the REMOTE switch is in the DISABLED position or the LOCKED/MAINTENANCE switch is in the LOCKED position.

REMOTE ENABLE REQUIRED

An attempt was made to operate the OSP in a remote mode, but the OSP REMOTE switch was in the DISABLE position or the LOCKED/MAINTENANCE switch was in the LOCKED position.

REMOTE PASSTHROUGH MODE ACTIVE

Message that appears when OSP has been placed in the REMOTE PASSTHROUGH mode.

REMOTE PASSTHROUGH MODE HAS TERMINATED

Message that appears when OSP has exited the REMOTE PASSTHROUGH mode.

REQUIRED DISK FILE NOT FOUND

The file requested was not found on the diskettes that were loaded into the OSP. The OSP disc directory may be defective, or the proper versions of the microdiagnostic files may not have been loaded.

RESET ENABLE ON PMI MUST BE SET

The RESET ENABLE switch on the PMI of the selected processor must be enabled to allow the microdiagnostic to proceed.

SYSTEM FREEZE NOT ASSERTED

An attempt was made to halt the system using a FREEZE command, but the FREEZE was not taken. Check the FREEZE ENABLE switch on the PMI.

SYSTEM FREEZE STILL ASSERTED

An attempt was made to restart the system using a THAW command, but the THAW was not taken.

YOU MAY NOT ENTER REMOTE PASSTHROUGH FROM REMOTE COOP MODE

Message displayed when operator attempts to enter REMOTE PASSTHROUGH (shifted F15) while in the REMOTE COOPERATIVE mode (shifted F16). The modes are mutually exclusive.

WAITING FOR MODEM CONNECTION

Message prompting the operator to make the modem connection that is necessary for the OSP to operate in any of the remote modes: REMOTE SERVICE, REMOTE PASSTHROUGH, or REMOTE COOPERATIVE.

6520 TERMINAL REQUIRED

An attempt has been made to enter a block mode screen from a terminal other than a T16/6520.

NOTE

The operator may also enter the block mode from a 6530 terminal.

NOTE

The following messages alert the operator to errors detected while testing the SMP RAM, device port USARTs, floppy disc controller, and interval timer.

RAM DATA ERROR . SHOULD BE xx IS yy AT zzzz CHIP ccc

RAM data error message for earlier NonStop II OSPs.

RAM PARITY ERROR SHOULD BE xx IS yy AT zzzz CHIP ccc

RAM parity error message for earlier NonStop II OSPs.

RAM ADDRESS ERROR SHOULD BE xxxx IS yyyy

RAM address error message for earlier NonStop II OSPs.

RAM ERROR, DATA IS xx, SHOULD BE yy, MAP=m, ADDRESS=zzzz, CHIP=c-ccc

RAM data error message for later NonStop II and NonStop TXP OSPs.

RAM PARITY ERROR, DATA IS xx, SHOULD BE yy, MAP=m, ADDRESS = zzzz, CHIP= c-ccc

RAM parity error message for later NonStop II and NonStop TXP OSPs.

RAM MAPPER ERROR, DATA IS xx, SHOULD BE yy, MAP=m, PAGE=p (or -p)

Address mapper error message for later NonStop II and NonStop TXP OSPs.

In these RAM error messages,

xx is the correct data
yy is the erroneous data
zzzz is the RAM address
ccc is the location designator of the defective RAM chip
map is the map value
address is the RAM address
page is the RAM block within the map.

uuu ddd USART FAILURE

USART error message,

where:

uuu is the location designator of the defective USART
ddd describes the particular device connected to this port, e. g., 6520 or 6530 terminal, modem, hard-copy printer, I/O power supply, PMI

DISC CONTROLLER FAILURE

Disc controller error message.

Because the disc controller is a single integrated circuit, no detailed error information is supplied.

TIMER INTERRUPT ERROR

Timer interrupt error message.

TIME DATA ERROR

Timer data error message.

LEVEL 0 BOOT FAILED - DISK (STATUS) TRACK (#) SECTOR (#)

The Level 0 Boot attempts to read track 0, sectors 1 through 9.

APPENDIX B
CONSOLE MESSAGES

B.0 CONSOLE MESSAGES

The GUARDIAN operating system produces the following messages and displays them on the system console.

Console messages provide useful information about the status of the system. Because they can serve as valuable aids in diagnosing hardware problems, these messages should be saved for several days before they are purged.

In all console messages, a percent sign (%) before a number indicates that the number is in octal. For each message, the error number, text, and meaning are described below.

Console messages appear in the following format:

```
[ <msg-num> ] { <timestamp> <sender-system>,<sender-cpu,pin> }

<message>


<msg-num>

  is a system message number (that appears only if the message
  was generated by a system process).


<timestamp>

  reflects the current time, as maintained by the system clock,
  written as:

  hour:minute day month year


<sender-system>,<sender-cpu,pin>

  indicates the system (if it is a node in a network), processor
  module, and process that originated the message.
```

→

<message>

is the text of the message, as generated by a system or application process. If present, "(BEL)" indicates that the console bell is sounded.

The <message> portion of console messages appears in the following format:

[[LOG TERMINAL] LDEV <ldev>, [SYS <sysnum>,]]

[CU %<ccu>] <text> [, CIU <path>] [<param> ...]

[(BEL)]

<ldev>

is the logical device number of the device reported upon in the message.

%<ccu>

is the controller or unit number with which the device is associated.

<sysnum>

in console logging device messages, is the identifying number of the system if it is a node in a network.

<text>

is a word or phrase in English describing the nature of the event being reported.

→

<path>

is the path of the message. This option is present only in messages referring to the 6100 Communications Subsystem. Determined at SYSGEN time or by the CMI ALTER command, the possible paths are Communications Interface Unit (CIU) A or B.

<param>

is one or more binary or octal words of device-dependent information that can be decoded for details of the event reported (usually an error condition).

(BEL)

indicates that the bell on the console is sounded. The bell rings for the more urgent console messages.

The messages and their associated message numbers and meanings are:

01 LDEV <ldev> [%<ccu>] UNEXPECTED MOUNT <dev-status> (BEL)

Operator mounted volume on device without entering corresponding LABEL or MOUNT command through PUP. <dev-status> indicates device status information, as described in "Decoding the Parameters of I/O-related Messages" later in this appendix. Enter LABEL or MOUNT command and remount volume.

02 LDEV <ldev> [%<ccu>] UNABLE TO ACCESS LABEL (BEL)

I/O operation could not access disc label. Call your Tandem representative if you believe the disc contains valid data; if you do not care about the current contents of the disc, enter LABEL command through PUP to create a label.

03 LDEV <ldev> [%<ccu>] I/O BUS ERROR <error> (BEL)

I/O bus error occurred during transfer with the device on channel controlled by sender CPU, and I/O path switch took place; <error> (in decimal) denotes a GUARDIAN file system error. Take action appropriate to <error> or call your Tandem representative.

04 LDEV <ldev> [%<ccu>] ERROR <dev-status> <param1> <param2> <param3> (BEL)

Error occurred on indicated device and I/O retry did not succeed. <dev-status> indicates device status information, as described in "Decoding the Parameters of I/O-related Messages" later in this appendix. The parameter values can be interpreted as follows:

- For disc devices, <param1> gives the most significant address, <param2> gives the least significant address, and <param3> is the current command being executed.
- For the TIL Controller, <param1> is the Address/Command word for the last EIO, as described in "Decoding the Parameters of I/O-related Messages" later in this appendix. <param2> is the file system error. Check these values in the GUARDIAN Operating System Programming Manual. If <dev-status>.<7> is set, then <param3> is the value of the PC_SAVE register of the controller when the hardware error was detected; otherwise, <param3> is zero. Either take appropriate action or call your Tandem representative. (Refer to message 97).
- For the 5520 Serial Matrix Printer, <dev-status> is the primary status returned from the printer. <param1> is the auxiliary status word if <dev-status>.<9:11>=7; otherwise this value is zero. <param2> is the file system error. <param3> is zero.
- For the 5106 Tri-Density Tape Subsystem, <param1>, <param2>, and <param3> are zero. Corrective action may be needed; for example the tape drive could be dirty or the media could be bad.

05 LDEV <ldev> [%<ccu>] RETRY <dev-status> <param1> <param2> <param3>

Error occurred on indicated device and the I/O operation is being retried. <dev-status> indicates device status information, as described in "Decoding the Parameters of I/O-related Messages" later in this appendix. The parameters can be interpreted as follows:

- For disc devices, <param1> and <param2>, when concatenated into a double-word integer, are the logical byte address of the sector in error. <param3> is the current channel command to the controller.
- For the TIL Controller, <param1>, <param2>, and <param3> are as defined for message 04 above.

- For the 5520 Serial Matrix Printer, each time a Data Parity Error or a VFU load error is retried, message 05 is issued.

  For the 5520 Serial Matrix Printer, <dev-status>, <param1>, <param2>, and <param3> are as defined for message 04 above.

(Informative message only--no corrective action needed.) If the retry is not successful, another message (retry or error) is displayed.

06 LDEV <ldev> [%<ccu>] UP

Operator returned device to system through PUP UP or REVIVE command. (Informative message only--no corrective action needed.)

07 LDEV <ldev> [%<ccu>] DOWN (BEL)

Operator removed device from system through PUP DOWN command, or disc process removed device because it was an inoperable member of a mirrored volume. If DOWN command did not cause this message, call your Tandem representative.

08 LDEV <ldev> [%<ccu>] STAT1 <st1-f1> <st1-f2> <st1-f3>

Data communication line error-count exceeded its designated threshold value or was closed, and nonzero device statistics were recorded:

<st1-f1> = number of messages sent
<st1-f2> = number of messages received
<st1-f3> = number of NAKS received

(Informative message only--no corrective action needed.)

09 LDEV <ldev> [%<ccu>] STAT2 <st1-f1> <st1-f2> <st1-f3>

Data communication line error-count exceeded its designated threshold value or was closed, and nonzero device statistics were recorded:

<st2-f1> = number of BCC errors
<st2-f2> = number of format errors
<st2-f3> = number of retries

(Informative message only--no corrective action needed.)

10 LDEV ???? CU %<ccu> KILLED (BEL)

The sender CPU detected what appeared to be a continually-interrupting controller, and the system issued an EIO "kill" command to the controller. The sender CPU can no longer use this controller until the associated processor module is reloaded. Try reloading the processor module, or resetting the controller by turning its power off and on; if this fails, call your Tandem representative.

11 LDEV <ldev> [%<ccu>] INCONSISTENT MIRROR VOLUMES

Both disc devices of a mirrored volume have flagged the other device in the pair as down, or the incorrect pack is mounted on one of these devices. If this occurs on cold load, the processor halts (%313) and the system must be reloaded. If this occurs at any other time, the volume is flagged as down, and corrective action noted under "Reviving a Volume" in Section 4 must be taken.

12 LDEV <ldev> [%<ccu>] TOO MANY MESSAGES

Device issued abnormal number of I/O bus, error, and retry messages within logging period. Call your Tandem representative.

NOTE

Occasionally, a faulty device generates a large number of errors of types 03 (denoting an I/O bus error), 04 (denoting a retry error), and (05 denoting a successful retry); or of types 62 (denoting a channel error), 63 (denoting a bus channel error), and 65 (denoting an unexpected interrupt). When a device issues more than 14 of these messages within an 11-minute logging period, the operating system issues console message 12 and suspends logging of the recurring messages until the next logging period begins.

13 LOG TERMINAL LDEV <ldev>, SYS <sysnum>, DISC LOGGING ON

PUP CONSOLE command enabled logging to disc file $SYSTEM.SYSTEM.OPRLOG, or changed logging to remote console terminal. If <ldev> is 0000, logging to console terminal is disabled; otherwise, it is enabled. (Informative message only--no corrective action needed.)

14 LOG TERMINAL LDEV <ldev>, SYS <sysnum>, DISC LOGGING OFF

PUP CONSOLE command disabled logging to disc file $SYSTEM.SYSTEM.OPRLOG, or changed logging to remote console terminal. If <ldev> is 0000, logging to console terminal is disabled; otherwise, it is enabled. (Informative message only--no corrective action needed.)

15 LOG TERMINAL LDEV <ldev>, DISC LOGGING ON

PUP CONSOLE command enabled logging to disc file $SYSTEM.SYSTEM.OPRLOG, or changed logging to local console terminal. If <ldev> is 0000, logging to console terminal is disabled; otherwise it is enabled. (Informative message only--no corrective action needed.)

16 LOG TERMINAL LDEV <ldev>, DISC LOGGING OFF

PUP CONSOLE command disabled logging to disc file $SYSTEM.SYSTEM.OPRLOG, or changed logging to local console terminal. If <ldev> is 0000, logging to console terminal is disabled; otherwise, it is enabled. (Informative message only--no corrective action needed.)

17 OPERATOR TERMINAL I/O ERROR <error> (BEL)

I/O error occurred with the console terminal. <error> (in decimal) denotes a file system error number. Check this number and take the corrective action indicated, or call your Tandem representative.

18 $AOPR I/O ERROR <error> (BEL)

I/O error occurred when Operator Process attempted to log a message to the application process named $AOPR. This message appears only if $AOPR exists. <error> (in decimal) denotes a file system error number. Check this number and take corrective action indicated, or call your Tandem representative.

19 OPERATOR DISC FILE I/O ERROR <error> (BEL)

I/O error occurred with log file $SYSTEM.SYSTEM.OPRLOG. <error> (in decimal) denotes a file system error number. Check this number and take corrective action indicated, or call your Tandem representative.

NOTE

When an error occurs with the console terminal, or with the disc log file (including unavailable disc space), the device/file is closed and its logging state is flagged as OFF. No further messages are written to the log device/file in error until it is re-enabled by a PUP CONSOLE command, the device is placed UP, the system is cold loaded, or, if OPRLOG is full, it is renamed and the PUP CONSOLE command with the SWITCH option is entered.

20 X BUS TO PROCESSOR <n> DOWN (BEL)

This can be an informational message indicating the system's response to the Command Interpreter BUSDOWN command for the X-bus, in which case no corrective action is necessary. More typically, however, this message indicates a hardware failure on the X-bus; in that case, call your Tandem representative.

21 Y BUS TO PROCESSOR <n> DOWN (BEL)

This can be an informational message indicating the system's response to the Command Interpreter BUSDOWN command for the Y-bus, in which case no corrective action is necessary. More typically, however, this message indicates a hardware failure on the Y-bus; in that case, call your Tandem representative.

22 X BUS TO PROCESSOR <n> UP (BEL)

Operator entered the Command Interpreter BUSUP command to restore the X-bus on processor <n>. Note that once a bus is disabled, it remains down until manually restored with the BUSUP command. (Informative message only--no corrective action needed.)

23 Y BUS TO PROCESSOR <n> UP (BEL)

Operator entered the Command Interpreter BUSUP command to restore the Y-bus on processor <n>. Note that once a bus is disabled, it remains down until manually restored with the BUSUP command. (Informative message only--no corrective action needed.)

24 X BUS ERRORS TO PROCESSOR <n> <timeouts> <resends>

Sending processor detected a problem on the X-bus. <timeouts> is the number of times that the sending processor received a CCL condition code following a send operation to processor <n>. <resends> indicates the number of times that the sending processor resent the message before it was accepted. If more than ten timeouts and resends occur in any 11 minutes, the operating system disables the bus path and issues console message 20. If this occurs, call your Tandem representative.

25 Y BUS ERRORS TO PROCESSOR <n> <timeouts> <resends>

Sending processor detected a problem on the Y-bus. <timeouts> is the number of times that the sending processor received a CCL condition code following a send operation to processor <n>. <resends> indicates the number of times that the sending processor resent the message before it was accepted. If more than ten timeouts and resends occur in any 11 minutes, the operating system disables the bus path and issues console message 20. If this occurs, call your Tandem representative.

26 X BUS ERRORS FROM PROCESSOR <n> <checksum-errors>

Checksum errors were detected on the X-bus by the receiving processor. <checksum-errors> is the number of errors detected. If more than ten of these occur in an 11-minute period, the operating system disables the faulty bus path and issues console message 20. If this occurs, call your Tandem representative.

27 Y BUS ERRORS FROM PROCESSOR <n> <checksum-errors>

Checksum errors were detected on the Y-bus by the receiving processor. <checksum-errors> is the number of errors detected. If more than ten of these occur in an 11-minute period, the operating system disables the faulty bus path and issues console message 20. If this occurs, call your Tandem representative.

28 BUS SEQ ERRORS FROM PROCESSOR <n> <seq-err> <unexpected>

This message is not necessarily associated with a bus hardware problem and can occur when the system is attempting to recover from other types of errors. <seq-err> indicates the number of out-of-sequence messages received from processor <n> and which are purged from the system to prevent further errors. <unexpected> indicates number of unexpected messages received from processor <n>. (Informative message only--no corrective action needed.)

29 LDEV <ldev> [%<ccu>] CORRECTABLE ECC ERRORS - <numerrs> %<address1> %<address2>

Correctable disc errors have occurred within last 11 minutes. <numerrs> denotes the number of these errors, <address1> and <address2> form a double word indicating the byte address of the most recent error. This message never appears more than once every 11 minutes. (Informative message only--no corrective action needed.)

30 UNCORRECTABLE MEMORY ERROR: %<syndrome1> %<syndrome2> %<syndrome3> (BEL)

Uncorrectable memory error occurred in the sender processor. %<syndrome3> always has the value %000000 when reported from a NonStop II processor; it represents the contents of the MSTATUS register when reported from a NonStop TXP processor. Call your Tandem representative.

31 BAD VOLUME LABEL, SECTION <param> (BEL)

Volume label contains bad data. <param> indicates section (field) containing this data. If the data on the volume is no longer needed, then relabel the volume. Otherwise, call your Tandem representatiive.

32 CORRECTABLE MEMORY ERROR: %<syndrome1> %<syndrome2> %<syndrome3>

Correctable memory error occurred in sender processor. %<syndrome3> always has the value %000000 when reported from a NonStop II processor; it represents the contents of the MSTATUS register when reported from a NonStop TXP processor.

33 LDEV <ldev> NET: LINE QUALITY <nnn>
X25:

Network line handler reported a change in the line quality. This report occurs whenever a change greater than or equal to 5% occurs. If this message occurs repeatedly, or a large value is specified, call your Tandem representative.

34 NET: LOGGING AT SYS <nnn>

Network logging was shifted to the Network Monitor Center at system <nnn>. This message appears only on systems connected to a network and using the Network Monitor Center option. (Informative message only--no corrective action needed.)

35 NET: LOCAL LOGGING RESUMED

Network logging was returned to the local system. This message appears only on systems connected to a network and using the Network Monitor Center option. (Informative message only--no corrective action needed.)

36 OPERATOR MESSAGE LOST <num>

Device to which operator messages are logged could not keep up with message output. <num> is the number of messages lost. (Informative message only--but operator may redirect messages to faster device if desired.)

37 CCL RETURNED FROM IIO/HIIO, %<status1>, %<status2>, %<status3> (BEL)

I/O interrupt occurred, but the I/O instruction failed with a condition code CCL. %<status1> (RIC) and %<status2> (RIST) are parameters returned from the offending IIO or HIIO instruction. Figure B-1 shows the format for this message. Call your Tandem representative.

CCL RETURNED FROM IIO/HIIO, %<status1>, %<status2>, %<status3>

— %<status1> is the Interrupt Cause Word and has the following form:

0	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
P O N	DEVICE STATUS

PON is POWER ON INTERRUPT

— %<status2> is the Interrupt Status Word and has the following form:

0	1	2	3	4	5	6	7	8 9 10 11 12	13 14 15
O	I	A	P	0	0	0	0	CONTROLLER NUMBER	UNIT NUMBER

O – OWNERSHIP ERR
I – INTERRUPT PENDING
A – OPERATION ABORTED BY CHANNEL
P – PARITY ON DATA FROM CHANNEL

— %<status3> is the Channel Status that defines a possible channel error and may have the following values:

%000000	No error detected by channel.
%000100	The INTERRUPT STATUS word bits <0:3> were not all zeros.
%000200	Channel detected a parity error in the INTERRUPT CAUSE word.
%000400	Channel detected a parity error in the INTERRUPT STATUS word.
%1XXXXX	If bit 0 is set to a 1 the channel status word is the contents of the CTI register. This register contains the I/O CONTROL FIELD.

The I/O CONTROL FIELD has the following form:

0	1	2	3	4	5	6	7	8	9	10	11	12 13 14 15
IO ER R	S V O	S V I	S T I	E O T	PA DO	PA DI	O D D	R C I	HI RQ	LI RQ	RE SE T	T BUS

Possible T BUS commands during an IIO/HIIO are:

1001	LOW PRIORITY INTERRUPT POLL (Determines who INTERRUPTED).
1010	HIGH PRIORITY INTERRUPT POLL (Determines who INTERRUPTED).
0001	SELECT (SELECTS A CONTROLLER FOR INTERRUPT).
1110	Reads the Interrupt Cause Word from the Controller.
1101	Reads the Interrupt Status Word from the Controller.
0010	Deselects Controller.
0011	Abort because of bad status.

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Figure B-1 Format for Console Message 37

40 PROCESSOR <cpu> IS DOWN (BEL)

Sender processor failed to receive an I'M ALIVE message from processor <cpu> within twice the configured polling interval. Sender processor assumes processor <cpu> is inoperable and thus transmits no further messages to it. This message always appears for informative purposes when the RESET Switch is set. If it appears for any other reason, it indicates a hard error; call your Tandem representative.

41 PROCESSOR UP

Sender processor was loaded. (Informative message only--no corrective action needed.)

42 * POWER ON * (BEL)

Power has been restored to the sender processor after a power failure occurred. (Informative message only--no corrective action needed.)

43 LDEV <ldev> NET: CONNECTION LOST TO SYS <nnn> <xxx> (BEL)

If <xxx> is 001, the Network Control Process determined that all paths to system <nnn> are unavailable. If <xxx> is 004, however, the line handler reported an end-to-end protocol error. If <xxx> is 999, the line handler reported a recovery from a soft failure, possibly related to path timing. The Network Control Process attempts to re-establish the connection over the same path; if it fails in this attempt, the line handler seeks an alternate path. (Informative message only--no corrective action necessary unless other messages appear.)

44 LDEV <ldev> NET: LINE READY
X25:

Line handler became ready to accept network requests. For a Direct Connect Line Handler, this occurs after both line handlers (local and remote) have exchanged reset sequences. For the X.25 interface, this occurs when the line handler is informed that a virtual circuit was established or learns of the circuit by querying the X.25 Access Process. When the line is an INFOSAT line, this message indicates that the Satellite Link Manager (SLM) has established communication with the Earth Station Controller (ESC). (Informative message only--no corrective action is needed.)

45 LDEV <ldev> NET: LINE NOT READY, ERROR <errnum> (BEL)
X25:

Line handler reported an error condition that cannot be resolved by normal retry mechanisms. For the EXPAND line handler, this means that the line handler is not ready to accept further network requests and causes the Network Control Process to find an alternate communication path. When the line is an INFOSAT line, this message indicates that the Satellite Link Manager (SLM) has lost communication with the Earth Station Controller (ESC). <errnum> reflects the actual error reported. (Informative message only--no corrective action needed.)

46 LDEV <ldev> NET: CONNECTED TO SYS <nnn>

Successful connect exchange occurred with the Network Control Process at the remote system <nnn>. (Informative message only--no corrective action needed.)

47 LDEV <ldev> NET: LVL 4 TIMEOUT TO SYS <nnn> (BEL)

Line handler did not receive an end-to-end response within the configured timeout and retry values. (Informative message only--no corrective action needed.)

48 NET: SYS <nnn> CPU STATUS <pppppppppppppppp> (BEL)

Change in processor status at system <nnn> occurred. The UP/DOWN status (p) of the individual processor modules is indicated by 1 for UP and 0 for DOWN. The leftmost number (p) indicates the status of processor 0, the second number from the left indicates the status of processor 1, and so forth. This message is sent only by a Network Control Process with Network Monitor Center status. (Informative message only--no corrective action needed.)

49 LDEV <ldev> NET: SYS <nnn> NOT RESPONDING (BEL)

Network Control Process did not receive a status message from the Network Control Process at system <nnn> for three time periods. The Network Control Process automatically seeks an alternate path. (Informative message only--no corrective action needed unless other related messages appear.)

50 CAN'T ALLOCATE RECEIVER'S LCB FOR <cpu,pin> (BEL)

Interprocess message transfer failed because an LCB is not available in the receiver processor. Configure additional LCBs into the system or locate the offending consumer of LCBs; if these steps fail, call your Tandem representative.

51 CAN'T ALLOCATE SENDER'S LCB FOR <cpu,pin> (BEL)

Interprocess message transfer failed because an LCB was not available in the sender processor. Configure additional LCBs into system or locate the offending consumer of LCBs; if these steps fail, call your Tandem representative.

52 $RECEIVE QUEUE FOR <cpu,pin> LONGER THAN 10 REQUESTS

Process <pin> accumulated eleven messages on $RECEIVE. Check to see if your program is looping, running at too low a priority, not reserving LCBs when necessary, or not designed to handle $RECEIVE efficiently. Otherwise, call your Tandem representative.

54 NUMBER OF FREE LCBS IS LESS THAN 10% OF THE POOL

Less than 10% of the configured LCBs remain unallocated. This message is displayed every eleven minutes, as long as the condition persists. (Informative message only--no corrective action needed unless other related messages appear.)

55 <num> LCB ALLOCATION WAITS

Processes are awaiting allocation of LCBs. This message is displayed every 11 minutes, as long as the condition persists. (Informative message only--no corrective action needed unless other related messages appear.)

61 SCHANL ERROR %<status1> %<status2>

Subchannel error occurred. Figure B-2 shows the format for this message. Call your Tandem representative.

61 SCHANL ERROR %<status1> %<status2>

%	<status1>	<status2>
%00	RPS error with unknown TBUS command (NonStop TXP processor only).	
%01	RCI was asserted, but no device, Rank 0 or Rank 1, responded to the Reconnect Poll.	Contains CHANNEL TAG PATTERN TO BE ASSERTED IF POLL RESPONSE FOUND. Should be 040001 or 040401.
%16	UCME found in the first word of the IOC table (IOC0).	Contains CONTROLLER AND UNIT NO. BIT .<5> ON = DATA IN, OFF = DATA OUT
%17	A Map for the current IOC page is marked absent.	Contains CONTROLLER AND UNIT NO. BIT .<5> ON = DATA IN, OFF = DATA OUT
%20	A CONTROLLER illegally sent a handshake during a Reconnect Poll of Rank 0.	Contains POLL CHANNEL TAG PATTERN FOR RANK 0. Should be 040001.
%21	A device illegally sent a handshake during a Reconnect Poll of Rank 1.	Contains POLL CHANNEL TAG PATTERN FOR RANK 0. Should be 040401.
%22	A device did not handshake correctly during a SELECT TBUS function.	Contains the Poll Response SELECT BIT, ASSERTED BY THE CHANNEL
%23	A device did not handshake correctly or a parity error occurred on the data during a READ ADDRESS COMMAND TBUS function.	Contains CONTROLLER AND UNIT NO. BIT .<5> ON = DATA IN, OFF = DATA OUT
%24	A device has had a continuous Reconnect pending.	Contains CONTROLLER AND UNIT NO. BIT .<5> ON = DATA IN, OFF = DATA OUT
%77	Unknown RPS freeze (NonStop TXP processor only).	

ADDRESS AND COMMAND WORD FORMAT

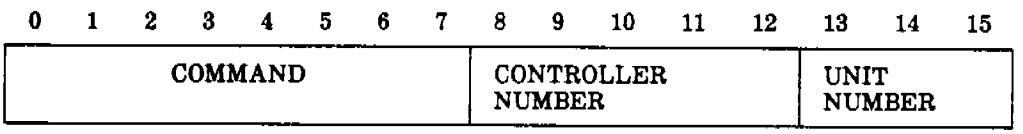

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Figure B-2 Format for Console Message 61

62 EIO BUS ERROR <errnum> EIO STATUS %<status1>, %<status2>

Channel error occurred during EIO instruction. Figure B-3 shows the format for this message. Call your Tandem representative.

EIO BUS ERROR <errnum> EIO STATUS %<status1>, %<status2>

- <errnum> is File Management Error
- %<status1> is EIO Status Word which is DEVICE DEPENDENT STATUS
- %<status2> is Channel Status

Channel Status defines a possible channel error and may have the following values:

%000000	No error detected by channel.
%000100	The EIO Status Word *device status* bit <0:3> were not all zeros.
%000400	Channel detected a parity error in the EIO STATUS word.
%1XXXXX	If bit 0 is set to a 1 the channel status word is the contents of the CTI register. This register contains the I/O CONTROL FIELD.

I/O CONTROL FIELD

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
IO ERR	SVO	SVI	STI	EOT	PA DO	PA DI	ODD	RCI	HI RQ	LI RQ	RESET	T BUS			

Possible T BUS commands during an EIO (Execute Input/Output)

0100	Loads the Address Command Word into the Controller.
0101	Loads the Parameter Word into the Controller.
1100	Reads the EIO Status Word (device status) from the Controller.
0010	Deselects Controller if EIO STATUS was OK; allows the Controller to perform the command.
0011	Channel Aborts Command because EIO Status was bad.

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Figure B-3 Format for Console Message 62

63 IIO/HIIO BUS CHANNEL ERR<num> <status1> <status2> <status3> <status4>

Bus channel error occurred. Figure B-4 shows the format for this message. Call your Tandem representative.

```
IIO/HIIO Chan. ERR<num> INT STATUS  <status1> <status2> <status3> <status4>
```

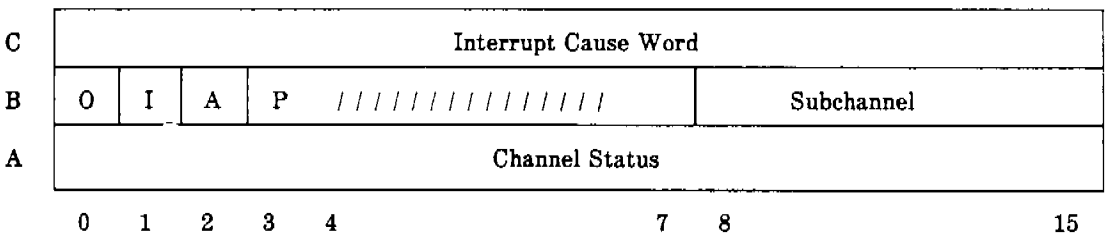
— <num> is a File System Error number.

— <status1> is the Interrupt Cause Word from Read Interrupt Cause (RIC) and is a device dependent value.

— <status2> is the Interrupt Status Word.

When an EIO operation completes, an interrupt occurs. At this point, an IIO instruction (or HIIO if the interrupt was a high-priority I/O interrupt) must be executed to determine the cause of the interrupt. This instruction returns three words of information and sets the condition code in the same way that the EIO instruction does. The three words have the following format:

Word



Word A = the Channel Status explained below as status 3.
Word B = the Interrupt Status from Read Interrupt Status (RIST) as follows:
O - Ownership. If set, indicates device is owned by other port.
I - Interrupt pending. If set, indicates device is signaling interrupt.
A - Abort. If set, indicates aborted data transfer.
P - Parity error. If set, indicates parity error detected during a channel-to-device transfer.
Word C = the Interrupt Cause Word explained above as status1.

— <status3> is Channel Status that defines a possible channel error and may have the following values:

%000000	No error detected by channel.
%000100	The INTERRUPT STATUS word bits <0:3> were not all zeros.
%000400	Channel detected a parity error in the INTERRUPT STATUS word.
%1XXXXX	If bit 0 is set to a 1, the channel status word is the contents of the CTI register. This register contains the I/O CONTROL FIELD.

I/O CONTROL FIELD

0	1	2	3	4	5	6	7	8	9	10	11	12 13 14 15
IOERR	SVO	SVI	STI	EOT	PADO	PADI	ODD	RCI	HIRQ	LIRQ	RESET	T BUS

Possible T BUS commands during an IIO/HIIO (Interrogate Input/Output)

1001	Low Priority Interrupt Poll (determine who interrupted).
1010	High Priority Interrupt Poll (determine who interrupted).
0001	Select (Selects the controller).
1110	Reads the Interrupt Cause Word from the Controller.
1101	Reads the Interrupt Status Word from the Controller.
0010	Deselects Controller. 0011 Abort because of bad status.
0011	Abort because of bad status.

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Figure B-4 Format for Console Message 63

– <status4> is the IOC Status. The IOC Status is the status information that is stored in the device's IOC table.

%00	I/O incomplete.
%01	End, either byte count reached zero or device stopped transfer with STI and PADI.
%02	Zero byte count on WRITE.
%03	Zero byte count on READ.
%06	Controller command not read or write.
%07	Reconnect when status field already %01.
%10	CHANNEL sent EOT and device did not return STI.
%11	UCME on IOC1 (NonStop II processor only).
%12	UCME on IOC2 (NonStop II processor only).
%13	Parity error on IOBUS data to CHANNEL.
%14	Protect bit, IOCO.<0> on for READ.
%15	CHANNEL sent PADO and device did not return PADI.
%16	Device returned both SVI and STI.
%17	UCME on data word during transfer.
%20	Memory address breakpoint hit on IOC0 (NonStop II processor only).
%21	Memory address breakpoint hit on IOC1 (NonStop II processor only).
%22	Memory address breakpoint hit on IOC2 (NonStop II processor only).
%23	Memory address breakpoint hit while reading data (NonStop II processor only).
%24	Memory address breakpoint hit while writing data (NonStop II processor only).
%25	Timeout during data transfer.
%26	Device returned PADI without STI.
%27	Device returned PADI on a write, when PADO was not asserted.
%30	Page absent during data transfer.
%31	Page absent on IOC1, IOC2, or IOC3 (NonStop II processor only).

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Figure B-4 Format for Console Message 63 (continued)

64 MUST USE PUP REBUILDDFS

Disc Free Space (DFS) Table contains bad data. Use the PUP REBUILDDFS command to rebuild this table.

65 LDEV <ldev> [%<ccu>] UNEXPECTED INTERRUPT <dev-status> (BEL)

Device was taken off line and then brought on line again. If there is no apparent explanation for this, call your Tandem representative. <dev-status> indicates device status information as described in "Decoding the Parameters of I/O-related Messages" later in this appendix.

66 LDEV <ldev> DAX:LEVEL <l> STATE %<ssssss> EVENT <ee>

Protocol failure occurred, and Levels 2 and 3 reset to the idle state. <ldev> is logical device number of the line handler, <l> is level reporting the error (2 or 3), %<ssssss> is state in error, and <ee> is event number in error. Call your Tandem representative.

67 LDEV <ldev> DAX: SUBDEV <ddd> ERROR <errnum>

This message generally indicates that an operation or a request to a subdevice was bad. <ldev> is the logical device number of the line handler, <ddd> is the subdevice number (use CUP to identify the subdevice), and <errnum> is the file system error number.

68 EXERCISE START

EXERCISE process was started. (Informative message only--no corrective action is necessary.)

69 EXERCISE STOP

EXERCISE process terminated. (Informative message only--no corrective action is necessary.)

70 QUAD MICROCODE FILE ERROR <errnum> (BEL)

Error occurred during loading of QUAD microcode file. <errnum> reports the file system error number, which determines corrective action to take.

71 FLOATING POINT MICROCODE FILE ERROR <errnum> (BEL)

Error occurred during loading of floating point microcode file. <errnum> reports the file system error number, which determines corrective action to take.

72 UNABLE TO OPEN OSIMAGE FILE ERROR <errnum> (BEL)

System monitor process could not open disc file that contains operating system images, during cold load or reload operation. A system freeze follows this message. <errnum> reports file system error number, which determines corrective action to take.

73 UNABLE TO CREATE COMINT, NEWPROCESS ERROR <errnum> (BEL)

System monitor process could not create the start-up Command Interpreter during cold-load operation. A system freeze follows this message. <errnum> reports a file system error number, which determines corrective action to take.

74 PROCESS INTERNAL ERROR %<param> (BEL)

Communication process detected an error. <param> denotes specific error information, which is process-dependent. Call your Tandem representative.

75 SYSTEM COLD LOADED FROM A DOWNED DISC

Operator attempted to cold load system from a disc device in DOWN state. Select corresponding mirrored disc and cold load from that.

80 CONSOLE LOGGING OF SYSTEM MESSAGE <number> ENABLED

The DISABLE and ENABLE parameters of the PUP CONSOLE command allow console logging of a specific system message to be disabled and then reenabled. (Unless specifically disabled, console logging of system messages occurs by default.) Console message 80 indicates that logging of the specified console message, previously disabled, has been reenabled. An informative message only, it requires no action.

81 CONSOLE LOGGING OF SYSTEM MESSAGE <number> DISABLED

The DISABLE and ENABLE parameters of the PUP CONSOLE command allow console logging of a specific system message to be disabled and then reenabled. (Unless specifically disabled, console logging of system messages occurs by default.) Console message 81 indicates that logging of the specified console message has been disabled. An informative message only, it requires no action.

82 CONSOLE LOGGING OF SYSTEM MESSAGES ENABLED

The DISABLE and ENABLE parameters of the PUP CONSOLE command allow console logging of all system messages to be disabled and then reenabled. (Unless specifically disabled, console logging of system messages occurs by default.) Console message 82 indicates that the logging of system console messages, previously disabled, has been reenabled. An informative message only, it requires no action.

83 CONSOLE LOGGING OF SYSTEM MESSAGES DISABLED

The DISABLE and ENABLE parameters of the PUP CONSOLE command allow console logging of all system messages to be disabled and then reenabled. (Unless specifically disabled, console logging of system messages occurs by default.) Console message 83 indicates that the logging of system console messages, previously enabled, has been disabled. An informative message only, it requires no action.

84 AUDCONFG FILE OPEN FAILURE ERROR <error> (BEL)

A TMF system process cannot open the audit configuration file, which stores the configuration information resulting from ADD commands. Shut down the application. Using TMFCOM, attempt to stop TMF. If this is unsuccessful, cold load the system and use the rollforward facility. In either case, using TMFCOM, issue the INITIALIZE TMF ! command.

85 AUDCONFG FILE I/O ERROR <error> (BEL)

A TMF system process cannot read from or write to the audit configuration file. Shut down the application. Using TMFCOM, attempt to stop TMF. If this is unsuccessful, cold load the system and use the rollforward facility. In either case, using TMFCOM, issue the INITIALIZE TMF ! command.

86 AUDIT FILE OPEN ERROR <error>, SEQ <number> (BEL)

A TMF system process cannot open an audit-trail file. Shut down the application. Using TMFCOM, attempt to stop TMF. If this is unsuccessful, cold load the system and use the rollforward facility. In either case, using TMFCOM, issue the INITIALIZE TMF ! command.

87 AUDIT FILE WRITE ERROR <error>, SEQ <number> (BEL)

A TMF system process cannot write to an audit-trail file. Shut down the application. Using TMFCOM, attempt to stop TMF. If this is unsuccessful, cold load the system and use the rollforward facility. In either case, using TMFCOM, issue the INITIALIZE TMF ! command.

88 UNABLE TO COMMUNICATE WITH BACKOUT PROCESS, ERROR <error> (BEL)

A TMF system process cannot exchange messages with the backout process. Shut down the application. Using TMFCOM, attempt to stop TMF. If this is unsuccessful, cold load the system and use the rollforward facility. In either case, using TMFCOM, issue the START TMF command.

89 BACKOUT ERROR <error> TRANSACTION SEQ <number> (BEL)

The backout process encountered the indicated file system error. Using TMFCOM, issue the ABORT TRANSACTION command for the transaction specified in the console message. If this message occurs again, delete the transaction.

90 TOO MANY LINES GEN'D FOR THIS PATH (BEL)

More than one logical device for an EXPAND path (or path/line combination) is specified, or more than eight logical devices for lines are specified for a single path. Configure the system with fewer lines.

91 ILLEGAL SUBTYPE SPECIFIED (BEL)

A logical device for the EXPAND network is specified with the incorrect subtype. Change the subtype to 0, 1, or 2.

92 TMF SUSPENDED DUE TO MULTI-CPU FAILURE: FILE CONSISTENCY IN DOUBT (BEL)

Failures in two or more processors interrupted TMF operation. Cold load the system and use the rollforward facility to recover your data base.

93 TMF SUSPENDED BEGIN-TRANSACTIONS: AUDIT TRAIL <number> AT 'MAXFILES' (BEL)

The indicated audit trail has filled (MAXFILES - 1) files and, as a result, TMF prohibits processing of new transactions for that audit trail. (Informative message only--no corrective action needed.)

94 TMF ENABLED BEGIN-TRANSACTIONS: NO AUDIT TRAILS AT 'MAXFILES'

The situation causing message 93 has been relieved and processing of new transactions is reenabled. (Informative message only--no corrective action needed.)

95 TMP ENCOUNTERED UNEXPECTED ERROR (<error>) ON LINK TO REMOTE TMP ON SYSTEM <system> (BEL)

The TMP encountered a problem while communicating with a remote TMP. Using NETMON, investigate and correct the problem.

96 TMP COULD NOT FIND DISTRIBUTED TRANSACTION (SEQ NO <number>) IN NAT (BEL)

An error occurred within TMF. Call your Tandem Representative.

97 LDEV <ldev> [%<ccu>] ERROR <dev-status> <ms-adr> <ls-adr> PHYS (BEL)

Error occurred on the indicated disc device and the I/O retry did not succeed. This message is displayed only when the disc was accessed by PUP. <dev-status> indicates device status information, as described in "Decoding the Parameters of I/O-related Messages" later in this appendix. PHYS indicates a physical address; the logical address is described in console message 04. Take appropriate action or call your Tandem representative.

98 LDEV <ldev> [%<ccu>] RETRY <dev-status> <ms-adr> <ls-adr> PHYS

Error occurred on the indicated disc device and the I/O operation will be retried. This message is displayed only when the disc was accessed by PUP. <dev-status> is described in "Decoding the Parameters of I/O-related Messages" later in this appendix. PHYS indicates a physical address; the logical address is described in console message 5. (Informative message only--no corrective action needed.) If the retry is not successful, another message (retry or error) will be displayed.

99 TMF INTERNAL ERROR <error> DETAIL CODE %<XXXXXX> (BEL)

An error occurred within TMF. Report the error number, the detail code, and the circumstances of the occurrence to your Tandem representative.

100 LDEV <ldev> [%<ccu>] MICROCODE LOADING FAILURE <param1> <param2> (BEL)

An error occurred when downloading microcode to the specified controller. <param1> is a file system error number. File system error %301 (193) indicates that a disc file error occurred while accessing a microcode file. When <param1> is %301, <param2> is the specific file system error number; otherwise, <param2> is zero. Corrective action: restore the microcode file subvolume from your Site Update Tape (SUT) and issue a PUP LOADMICROCODE command.

101 LDEV <ldev> [%<ccu>] MICROCODE EXECUTION FAILURE (BEL)

The controller microcode is not loaded for the specified device. This may happen following a controller power on. The operating system attempts to download the controller. (Informative message only--no corrective action needed.)

102 LDEV <ldev> [%<ccu>] MICROCODE LOADED SUCCESSFULLY <param> (BEL)

The device specified has been successfully downloaded. <param> is zero if the primary microcode file ($SYSTEM.<Mhpn.hhhppp>) was downloaded. <param> is one if the backup microcode file ($SYSTEM.SYS<nn>.<Mhpn>) was loaded. (For the definitions of <Mhpn.hhhppp> and additional information about loading the microcode see the LOADMICROCODE command in Section 5 of this manual.) This message always appears when the processor containing the primary I/O process for the tape is loaded. If <param> is 1, restore the microcode file subvolume from the Site Update Tape (SUT) and issue a PUP LOADMICROCODE command.

103 LDEV <ldev> [%<ccu>] INTERRUPT OVERRUN, CURRENT STATUS <param1>, PREVIOUS STATUS <param2> (BEL)

This message occurs when a device interrupts more than once before its I/O process has processed the first interrupt. The two octal numbers printed as <param1> and <param2> are the previous and current device (interrupt) status. (To correct the cause of failure, call your Tandem representative.)

104 LDEV <ldev> [%<ccu>] FATAL CONTROLLER ERROR <dev-status> <param1> <param2> <param3> (BEL)

This message indicates that a fatal controller error has occurred. The controller continues to respond to all subsequent requests with the error in <param1> until corrective action is taken. On 3206 controllers, this error may be cleared by a PUP LOADMICROCODE command, controller power off, or processor reset. <dev-status> is the interrupt cause word returned from the controller and is described in "Decoding the Parameters of I/O-related Messages" later in this appendix. <param1>, <param2>, and <param3> are zero. Call your Tandem representative.

105 TMP COMMUNICATION ERROR <error>

This message is displayed when communication between a disc process and the TMF transaction monitor process (TMP) is interrupted, or when the TMP is prevented from creating a new file in an audit-trail sequence. The latter might be due to insufficient disc space.

106 LDEV <ldev> INSUFFICIENT BUFFER SPACE ALLOCATED IN SYSGEN

The dedicated buffer size specified for this line handler in the I/O configuration section of the SYSGEN configuration file is too small to allow the line handler to operate properly. The line handler will not accept any operations until the system is reconfigured with a larger buffer size specified.

107 LDEV <ldev> [%<ccu>] UNIT LITERAL PROM %<nnn> INCOMPATIBLE WITH DISC SUBTYPE <ss>

This message appears when the unit literal PROM version <nnn> does not support a disc device of the configured subtype <ss>. If the disc device was configured correctly at SYSGEN, contact your Tandem representative.

108 LDEV <ldev> [%<ccu>] INCORRECT UNIT TYPE <u1>; DISC SUBTYPE <ss> EXPECTS UNIT TYPE <u2>

This message is issued when the configured disc subtype <ss> of the disc device does not correspond to the physical unit type. The physical unit attached has type <u1>, but the physical unit should be type <u2>. Make sure that the device was configured correctly at SYSGEN and check for cabling problems or an incorrect unit plug. Otherwise, it could be an error in the controller select logic; contact your Tandem representative.

109 LDEV <ldev> X25: LCN <aaa> ERR <bbb> CAUSE <ccc>

This message indicates that X25AM has reset or cleared on a logical channel for reasons specified in <aaa>, <bbb>, and <ccc>. <aaa> indicates which X.25 logical channel is in error. <bbb> is a file system error code as follows:

122 = LCN reset by X25AM due to cause/reason error code 201 or 202
140 = LCN cleared by X25AM due to cause/reason error code 203

<ccc> gives the cause/reason code of the LCN error as follows:

201 = invalid P(R) received in packet
202 = invalid P(S) received in packet
203 = packet size greater than negotiated size

110 SYSTEM CLOCK RESET

This message is displayed when the clock changes by more than 1 minute. There are two situations where this message appears on the operator console: if the operator issues a SETTIME command (for some reason the system time is inaccurate, such as time change) or if something internally caused a CPU clock to change and that CPU clock is reset.

111 LDEV <ldev> DAX: SUBDEV <ddd> RE-POLL STATE <s>

This message is an indication of a SLOWPOLL state change for a particular data communications subdevice. <ldev> is the logical device number of the line handler. <ddd> is the subdevice number. <s> is zero when the the SLOWPOLL timer of the subdevice has elapsed. <s> is one when the SLOWPOLL timer has been initiated. Use CUP or CMI to identify the subdevice name from the number.

112 LDEV <ldev> DAX: SUBDEV <ddd> SELECTED AND NOT OPEN/JOINED, DATA DISCARDED

This message applies to TR3271 subdevices only. When the line handler has been SYSGENed with an INITSTATUS of %177777 and a subdevice has been SELECTed (by the host) but not OPENed by an application process or JOINed to an AM3270 subdevice, the SELECT is acknowledged (as well as the data) and this message is output to the console. <ldev> is the logical device number of the line handler. <ddd> is the subdevice number. Use CUP or CMI to identify the subdevice name from the number.

131 QUAD MICROCODE INCOMPATIBLE WITH CURRENT SOFTWARE VERSION (BEL)

This message indicates that the decimal arithmetic option microcode (QUAD) is not current and has not been loaded. Restore the proper optional microcode files (QUADOBJ and QUAD2) from the Site Update Tape to the current system subvolume.

132 FLOATING POINT MICROCODE INCOMPATIBLE WITH CURRENT SOFTWARE VERSION (BEL)

This message indicates that the floating-point arithmetic option microcode (FLOAT) is not current and has not been loaded. Restore the proper optional microcode files (FLOATOBJ and FLOAT2) from the Site Update Tape to the current system subvolume.

133 <path> BUS DOWN

The indicated FOX interprocessor bus path has been downed by the IPB monitor process. (Informative message only--no corrective action needed.)

134 <path> BUS UP

The indicated FOX interprocessor bus path has been brought up by the IPB monitor process. (Informative message only--no corrective action needed.)

135 <path> BUS SHUT DOWN TO CLUSTER <cc>, PROCESSOR <pp>

The indicated FOX interprocessor bus path was taken out of service because too many errors have occurred in a ten-minute interval. If the error persists, contact your Tandem representative.

136 <path> BUS ERRORS TO CLUSTER <cc>, PROCESSOR <pp> <ttttt> <wwwww>

On the indicated FOX interprocessor bus path, messages to the cluster and processor indicated resulted in <ttttt> SEND instruction timeouts or <wwwww> WACK (waiting for acknowledgement) timeouts. If the error persists, contact your Tandem representative.

137 X BUS ERRORS FROM CLUSTER <cc>, PROCESSOR <pp> <ccccc> <rrrrr>

FOX interprocessor bus messages from the indicated cluster and processor caused <ccccc> checksum errors and <rrrrr> routing errors on the X bus. If the error persists, contact your Tandem representative.

138 Y BUS ERRORS FROM CLUSTER <cc>, PROCESSOR <pp> <ccccc> <rrrrr>

FOX interprocessor bus messages from the indicated cluster and processor caused <ccccc> checksum errors and <rrrrr> routing errors on the Y bus. If the error persists, contact your Tandem representative.

139 BUS SEQ ERRORS FROM CLUSTER <cc>, PROCESSOR <pp> <sssss> <uuuuu>

FOX interprocessor bus messages from the indicated cluster and processor caused <sssss> sequence errors and <uuuuu> unexpected packet interrupts. If the error persists, contact your Tandem representative.

140 CAN'T ALLOCATE RECEIVER'S LCB FOR CLUSTER <cc>, PROCESS ID <pp,ppp>

This message occurs when the system cannot allocate the LCB for the receiver of a message over the FOX interprocessor bus. The message is issued at the sending cluster and identifies the receiving cluster <cc> and process ID <pp,ppp>. If the error persists, contact your Tandem representative.

141 LDEV <ldev> [CU %<ccu>] CLIP DOWNLOADED, CIU <path>

The Communications Line Interface Processor (CLIP) of the 6100 Communications Subsystem (CSS) was downloaded. This message is informative only; no action is necessary. There are no parameter values.

142 LDEV <ldev> [CU %<ccu>] IO PROCESS MEMORY ERROR, CIU <path> %<parm3>

An error was detected in the I/O buffer pool management, causing the process to terminate. %<parm3> contains the program counter location where the failure occurred. Note the value and contact your Tandem representative.

143 LDEV <ldev> [CU %<ccu>] STAT3, CIU <path> %<parm3> %<parm4>

This message reports (in %<parm3> and %<parm4>) the final two statistics counters (7 and 8) used by the 6100 Communications Subsystem Manager (CSM). The STAT3 message is reported along with the GUARDIAN STAT1 and STAT2 console messages (numbers 08 and 09), which contain the first six statistics counters.

STAT3 messages can originate from either the Break Out Board (BOB) or the Communications Line Interface Processor (CLIP). You must check the subchannel address to determine if the message comes from the BOB or the CLIP. Generally, if bits 4 through 6 of the subchannel address are zeros, it is a BOB message. If bits 4 through 6 are nonzero, it is a CLIP message.

For BOB messages, counter 7 reports the BOB event frames, and counter 8 reports the number of failures to allocate to the I/O buffer.

For CLIP messages, counter 7 reports the number of times the CLIP has been downloaded, and counter 8 reports the number of failures to allocate to the I/O buffer.

For CSM purposes, STAT1 and STAT2 (console messages 8 and 9) have the following meanings:

STAT1:	Counter 1 - Fatal interrupt status
	Counter 2 - EIO issuance errors
	Counter 3 - Command reject frame received on CLB.
STAT2:	Counter 1 - Software timeouts
	Counter 2 - Retryable interrupt errors on read unit
	Counter 3 - Retryable interrupt errors on write unit.

If you get a number of retryable errors, you should schedule maintenance as soon as possible. If you get fatal errors, contact your Tandem representative.

144 LDEV <ldev> [CU %<ccu>] CMI TRACE SEGMENT FULL, TRACE STOPPED, CIU <path>

The trace segment was filled, and looping (recircling the buffer) was not specified. This message is informative only. There are no parameter values.

145 LDEV <ldev> [CU %<ccu>] CSS DOWNLOAD DISC ERROR, CIU <path> %<parm3>

The disc could not be accessed by the 6100 Communications Subsystem (CSS) download file. This message is accompanied by a GUARDIAN file system error code in %<parm3>. The action you take depends on the value in %<parm3>.

146 LDEV <ldev> [CU %<ccu>] CSS DOWNLOAD UNIT ERROR, CIU <path> %<parm3>

The 6100 Communications Subsystem (CSS) hardware failed while attempting to download the Communications Line Interface Processor (CLIP) or the Communications Interface Unit (CIU). This message is usually reported with console error message 154 or 155, or a GUARDIAN error message. %<parm3> contains the Communications Subsystem Manager (CSM) error code. Refer to "Decoding the Parameters of CSS-related Messages" later in this appendix for a list of CSM error codes. Analyze the failure by looking at the CSM error code in %<parm3> and the accompanying message.

147 LDEV <ldev> [CU %<ccu>] CSS STATUS PROBE ERROR, CIU <path> %<parm3>

The 6100 Communications Subsystem Manager (CSM) or I/O process received a status probe response from the Communications Line Interface Processor (CLIP), indicating it was in the BOOT state instead of the RUN state. <parm3> contains the CLIP status byte. Refer to "Decoding the Parameters of CSS-related Messages" later in this appendix for an explanation of the CLIP status byte. Decode the status byte to determine which error occurred. Note the error for a Tandem analyst and restart the CLIP.

148 LDEV <ldev> [CU %<ccu>] CSS CIU ERROR, CIU <path> %<parm3> %<parm4> %<parm5>

The Communications Interface Unit (CIU) of the 6100 Communications Subsystem (CSS) stopped. This is an informational message. The CIU error is logged on one CPU path while another CPU, if available, attempts to restart the CIU. If the same error occurs on the other CPU, it will retry again on the original CPU. If an error occurs here, the process terminates.- %<parm3>, %<parm4>, and %<parm5> provide details about the last error. Refer to "Decoding the Parameters of CSS-related Messages" later in this appendix for fuller explanation of their significance. %<parm3> is the CSM error code, %<parm4> is the RDST status word, and %<parm5> is the EIO parameter.

149 LDEV <ldev> [CU %<ccu>] CSS CIU STATUS CHANGE, CIU <path> %<parm3> %<parm4>

This message reports an unanticipated change in the status of the Communications Interface Unit (CIU) of the 6100 Communications Subsystem (CSS). Note that a status change is not reported when the CIU is coming up, but only when an unanticipated error occurs. %<parm3> contains the new CIU status, translated as follows:

0 - RUNNING
1 - SUSPENDED
2 - STOPPED
4 - BOOT
8 - DIAGNOSE

%<parm4> is the CSM error code. It tells you why the status changed. Refer to "Decoding the Parameters of CSS-related Messages" later in this appendix for a list of the CSM error codes. If you receive this error, note the information returned and attempt to restart the CIU by issuing the appropriate CMI commands. If this fails, contact your Tandem representative.

150 LDEV <ldev> [CU %<ccu>] CSS ACTIVATE PATH, CIU <path> %<parm3> %<parm4> %<parm5>

A Communications Line Interface Processor (CLIP) download request was received by the 6100 Communications Subsystem Manager (CSM). %<parm3> contains the requestor PID, %<parm4> contains the CLIP path and status, and %<parm5> contains the CLIP subchannel. This message is purely informative. No user action is necessary.

151 LDEV <ldev> [CU %<ccu>] CSS BOB FATAL ERROR FRAME, CIU <path> %<parm3> %<parm4>

The Break Out Board (BOB) of the 6100 Communications Subsystem (CSS) has reset itself. %<parm3> contains CLB (CIU to LIU Bus) frames A and C, and %<parm4> contains the sequence number and the BOB source. Refer to "Decoding the Parameters of CSS-related Messages" later in this appendix for a description of the BOB source. Note these parameters and contact your Tandem representative.

152 LDEV <ldev> [CU %<ccu>] CSS CLB COMMAND REJECT, CIU <path> %<parm3> %<parm4> %<parm5>

The Break Out Board (BOB) of the 6100 Communications Subsystem (CSS) and the host are not properly synchronized. This message normally appears if you power on or power off the BOB, or if you switch CPUs. In most cases, the BOB and the host recover (get back in sync) without any user action. If the error persists, contact your Tandem representative. %<parm3> contains CLB (CIU to LIU Bus) frames A and C. %<parm4> contains the sequence number and cause of the error. Cause is a binary number from 0 to 3 that indicates the cause of the command reject.

0 - Message checksum was invalid
1 - Command sequence number was invalid
2 - Command code was invalid
3 - Command parameter was invalid

%<parm5> contains the C-field and the sequence number of the rejected command.

153 LDEV <ldev> [CU %<ccu>] CSS BOB WARNING RECEIVED, CIU <path> %<parm3> %<parm4> %<parm5>

The Break Out Board (BOB) of the 6100 Communications Subsystem (CSS) has detected marginal functional errors (such as power supply or fan failure). %<parm3> contains CLB (CIU to LIU Bus) frames A and C; %<parm4> contains the sequence number and BOB source; and %<parm5> contains the BOB sense, which indicates the measured value of the power supply status at the time the BOB warning occurred. Refer to "Decoding the Parameters of CSS-related Messages" later in this appendix for a description of the BOB source field. If the problem persists, contact your Tandem representative.

154 LDEV <ldev> [CU %<ccu>] CSS EIO ERROR, CIU <path> %<parm3> %<parm4> %<parm5>

The Communications Interface Unit (CIU) of the 6100 Communications Subsystem (CSS) rejected an EIO command on issuance. %<parm3> contains the RDST status; %<parm4> contains the GUARDIAN error code; and %<parm5> contains the rejected EIO command. Refer to "Decoding the Parameters of CSS-related Messages" later in this appendix for a description of the RDST status word. Analyze %<parm3> and, %<parm4> to determine the reason for the error, and contact your Tandem representative.

155 LDEV <ldev> [CU %<ccu>] CSS INTERRUPT ERROR, CIU <path> %<parm3> %<parm4> %<parm5>

The Communications Interface Unit (CIU) of the 6100 Communications Subsystem (CSS) detected an EIO error on interrupt (instead of at issuance). %<parm3> contains the interrupt cause (RIC); %<parm4> contains the GUARDIAN error code; and %<parm5> contains the rejected EIO command. Refer to "Decoding the Parameters of CSS-related Messages" later in this appendix for a description of the RIC cause word. Analyze %<parm3> and %<parm4> to determine the reason for the error, and contact your Tandem representative.

156 LDEV <ldev> [CU %<ccu>] CSS NO RESPONSE, CIU <path> %<parm3> %<parm4>

I/O processes periodically probe the Communications Line Interface Processor (CLIP) of the 6100 Communications Subsystem. If the CLIP fails to respond to one of these probes, you receive a NO RESPONSE message. %<parm3> contains the SEND state of the CLIP, and %<parm4> contains the RECEIVE state of the CLIP.

157 LDEV <ldev> [CU %<ccu>] CSS FRAME ERROR, CIU <path> %<parm3> %<parm4> %<parm5>

An invalid frame was received. %<parm3> contains the reason for the error and can be one of the following:

0 - Unexpected frame
1 - Invalid "A" field (Address)
2 - Invalid "C" field (Control)
3 - Invalid "T" field (Type)
4 - Invalid "S" field (Sequence number)
5 - Invalid function

%<parm4> contains the "A" and "C" frames; %<parm5> contains the "T" and "S" frames.

158 LDEV <ldev> [CU %<ccu>] CSS UNEXPECTED BREAKPOINT, CIU <path> %<parm3>

The Communications Line Interface Processor (CLIP) of the 6100 Communications Subsystem (CSS) hit an unexpected breakpoint. The CLIP stops. Note the value of %<parm3>, and contact your Tandem representative.

159 LDEV <ldev> [CU %<ccu>] CSS BUFFER UNAVAILABLE, CIU <path>

The 6100 Communications Subsystem Manager (CSM) did not have enough buffer space to perform the requested operation. This message is informative only; no parameter values apply. Reissue the command and attempt the operation again.

160 LDEV <ldev> [CU %<ccu>] CSS LIU CONFIGURATION ERROR, CIU <path> %<parm3> %<parm4> %<parm5>

The Communications Line Interface Processor (CLIP) of the 6100 Communications Subsystem (CSS) received a line configuration different from that in the I/O process. Note the values of all parameters and contact your Tandem representative.

161 REVIVE FAILED TO FIX UP DISC MICROCODE SECTION

This message occurs if a REVIVE operation is attempted on the system disc and the disc microcode section of the system disc is bad. Issue the PUP command FIXMICROCODE.

164 LDEV <ldev> [CU %<ccu>] CSS LINE ERROR, CIU <path> %<parm3> %<parm4> %<parm5>

The Communications Line Interface Processor (CLIP) of the 6100 Communications Subsystem (CSS) responded to the I/O process with an invalid function/modifier. Note the values of all parameters and contact your Tandem representative.

165 LDEV <ldev> [CU %<ccu>] CSS SUBDEVICE ERROR, CIU <path> %<parm3> %<parm4> %<parm5>

The Communications Line Interface Processor (CLIP) of the 6100 Communications Subsystem (CSS) responded to the I/O process with an invalid subdevice state. Note the values of all parameters and contact your Tandem representative.

166 LDEV <ldev> LBU <x> NO RESPONSE TO STATUS POLL

Special function packets responding to status requests are not being received from the indicated FOX Local Bus Unit (LBU). If the LBU was powered off, this is normal; otherwise it indicates a failure of the LBU. Check the LBU CPB LED display.

167 LDEV <ldev> LBU <x> RESET HAS OCCURRED

The indicated FOX Local Bus Unit (LBU) entered the LCS UNLOADED state from the normal operational state. This is normal if power is lost and then returned. Automatic reload of Loadable Control Store occurs. (Informative message only.)

168 LDEV <ldev> LBU <x> STANDARD MICROCODE LOADED

The Loadable Control Store (LCS) loading procedure has completed. The indicated FOX Local Bus Unit (LBU) is now operational. (Informative message only.)

169 LDEV <ldev> LBU <x> LOAD FAILED - FILE <fff>, FLAGS %<nnnnnn>, STATUS %<ooo>, RESET %<rrr>, MCERR <mmm>

An attempt to load the indicated FOX Local Bus Unit (LBU) failed. If file access errors occurred on the microcode file, <fff> is the file system error code. If the firmware was loaded and a status packet was received, <nnnnnn> and <ooo> are the FLAGS and STATUS CODE fields of the status packet. The RESET CODE <rrr> is the reason supplied by the boot PROM reset reason code if applicable. The code in MCERR is returned by the standard microcode utility procedures. An MCERR not equal to zero indicates a mismatch between the data in the microcode file and the hardware part number and revision level. Note the values returned and contact your Tandem representative.

170 LDEV <ldev> LBU <x> WCS LOAD FOUND ACCEPTABLE

Upon initialization, the $IPB process found that the indicated FOX Local Bus Unit (LBU) already contained the correct version of the operational firmware. The controller was not reloaded. (Informative message only.)

171 LDEV <ldev> LBU <x> CONTROLLER FAILED - RESET %<rrr>, FLAGS %<nnnnnn>, STATUS %<ooo>

The indicated FOX Local Bus Unit (LBU) entered the error state. <nnnnnn> and <ooo> are the FLAGS and STATUS CODE fields of the status packet. The RESET CODE <rrr> is the reason supplied by the boot PROM reset reason code if applicable. Note the values returned and contact your Tandem representative.

172 LDEV <ldev> LBU <x> EXCESSIVE ERRORS OCCURRING

Internal error counters maintained by the indicated FOX Local Bus Unit (LBU) are being incremented at a rate faster than the preset threshold. The LBU STATUS display of CMI should be examined to determine the cause; use the CMI command, "CMI STATUS LBU UNDER $IPB, DETAIL". Note the values returned and contact your Tandem representative.

173 LDEV <ldev> PATH TO CLUSTER <cc> MAY HAVE FAILED - CHECK SUBNET STATUS

A discrepancy was detected between handshake packets sent and received over the FOX interprocessor bus. Examine the SUBNET status with CMI to determine the specific details. One or more of the four redundant paths to or from the specified cluster may have failed. If the error persists, contact your Tandem representative.

174 LDEV <ldev> IPB MONITOR FAILURE SYNDROME <aaaaa> <bbbbb>

The FOX IPB monitor process has detected a condition that prevents further processing. Any subsequent requests to the IPBMON process are rejected with file system error 66. Examine the syndrome fields to ascertain the reason for the failure.

The following codes are assigned:

00001 00000	The special function packet interface to the operating system could not be initialized. Occurs when $IPB is on a system not configured with the 6700 Fiber Optic Extension (FOX).
00002 00000	The IPB monitor was generated with a number of units not equal to one.
00003 00000	Memory could not be locked for the monitor process special function packet interface.

All of the above conditions can occur only immediately after the loading of the processor containing the IPB monitor process. Contact your Tandem representative.

188 UNABLE TO CREATE AUDIT TRAIL # <xxx> SEQ # <xxxxxx> DUE TO MAXFILES (BEL)

TMF processing can proceed no further because the maximum number of files (as set by MAXFILES) has been created for the indicated audit trail, and further processing would require creation of a file whose sequence number was MAXFILES+1. Call your Tandem representative.

Decoding the Parameters of I/O-Related Messages

The <dev-status> and other <param> values returned in console messages 01, 04, 05, 37, 62, 63, 65, 97, 98, and 104 are interpreted below for various device types.

DISC DEVICES. For all disc devices, <dev-status> is the status word returned from the disc device, shown in the following format:

Bit	Meaning (if set ON)
.<0>	Power on
.<1>	
.<2>	
.<3>	
.<4>	Termination code
.<5>	
.<6>	
.<7>	
.<8>	Read only
.<9>	Unit ownership error
.<10>	Write fault
.<11>	Seek error
.<12>	Not on cylinder
.<13>	Not ready
.<14>	
	Unit type
.<15>	

The termination code, represented by bits 1 through 7 of <dev-status>, can be interpreted as follows:

Device Status	Termination Code	Meaning
%004-	%1	Attention (seek completion or head load)
%010-	%2	Data error corrected
%014-	%3	Write protect
%020-	%4	Illegal address
%024-	%5	Direct access to alternate track
%030-	%6	Illegal opcode
%034-	%7	Unit status error (bits 8 through 13 valid)
%040-	%10	Buffer parity error
%044-	%11	Uncorrectable data error
%050-	%12	Missing servo check during write
%054-	%13	Verify error
%060-	%14	Header search failure
%064-	%15	Header miscompare
%070-	%16	ROM parity error
%074-	%17	Unit not present
%100-	%20	Unit present more than once
%104-	%21	Unit ownership error
%110-	%22	Unit not ready
%160-	%34	Controller malfunction
%200	%40	Checksum error detected in the data block received for a LOAD LOCS
%204	%41	Controller detected an invalid control store address or byte count in the block received for a Load LOCS or Define Return Control Block
%210	%42	Selftest failed
%214	%43	Power up test failed
%220	%44	Checksum error in NVRAM DATA
%224	%45	NVRAM has been written over 1000 times
%230	%46	O BUS parity error -- write transfer
%234	%47	I BUS parity error -- read transfer
%240	%50	ECC error on boot read
%244	%51	Controller detected a miscompare in the part number or the serial number received in the Update Revision Block and the numbers contained in its NVRAM storage
%250	%52	Not enough data received to perform operation
%764-	%175	Software detected structured checksum error
%770-	%176	Interrupt overrun occurred
%774-	%177	Software detected unstructured checksum error

NOTES

1. <dev-status> bits <8:13> are meaningful only if the termination code is %7 (Unit Status Error).

2. Termination codes of %23 through %33 indicate that the controller has succeeded in retrying a failed read operation by using a margin-offset error recovery technique. The specific termination code indicates which of the nine offset combinations was successful in the retry.

3. Termination codes of %40 through %52 apply only to the 3107 downloadable disc controller.

4. Termination code %34 indicates an idle-loop diagnostic error. (When the controller is idle--not busy servicing an I/O request--the controller performs diagnostic routines that check its internal registers and buffers. On discovering an internal error, the controller removes itself from the system by rejecting subsequent I/O requests and setting the termination code to %34. To reset the controller, turn its power off and then on again.)

<param1> and <param2>, when concatenated into a doubleword integer, provide the absolute address of the disc sector in error.

TAPE SUBSYSTEMS USING THE 3202 TAPE CONTROLLER~CL~. For the tape subsystems using the 3202 tape controller, <dev-status> is the interrupt cause word returned from the controller. The format of the interrupt cause word is as follows:

PON	ATT	RT	UE	OV	DPE	CRC	SR	WV	B	NR	TR	EOF	EOT	WR	BOT
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

PON - POWER ON INTERRUPT
ATT - ATTENTION INTERRUPT
RT - RUNAWAY TAPE
UE - UNUSUAL END
OV - DATA OVERRUN
DPE - DATA PARITY ERROR
CRC - CRC ERROR
SR - SHORT READ
WV - WRITE VIOLATION
B - BUSY
NR - NOT READY
TR - TAPE REWINDING
EOF - END OF FILE
EOT - END OF TAPE
WR - NO WRITE RING
BOT - LOAD POINT

The format of the EIO status word, returned as <status1> in console message 62, is as follows:

O	I	B	P	(undefined)											
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

O - OWNERSHIP ERROR
I - INTERRUPT PENDING
B - BUSY
P - PARITY ERROR

5106 TRI-DENSITY TAPE SUBSYSTEM~CL~. For the 5106 Tri-Density Tape Subsystem, <dev-status> is the interrupt cause word returned from the controller. The format of the interrupt cause word is as follows:

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
PON	BOT	EOF	EOT	ONL	WR	REW	*	*	TERMCODE						

where

PON	=	Power On
BOT	=	Beginning of Tape
EOF	=	End of File
EOT	=	End of Tape
ONL	=	Online
WR	=	Write Ring
REW	=	Rewinding
*	=	Reserved
TERMCODE	=	Termination Code

The termination codes for the 5106 Tri-Density Tape Subsystem (returned in bits <9:15>) are listed in Table B.1.

Table B.1. Termination Codes for the 5106 Tri-Density Tape Subsystem

Code	Meaning	
%000 (0)	No error	
%001 (1)	Attention-online; drive, formatter, or controller power on	
%043 (35)	Bad Length	
%044 (36)	Write retried	Soft operational errors - operation completed, no corrective action needed
%045 (37)	Read retried	
%046 (38)	Skip residue	
%047 (39)	Correctable data	
%050 (40)	Uncorrectable data	
%051 (41)	Formatter command reject	
%052 (42)	Operation failure	
%053 (43)	Write failure	
%054 (44)	Undefined command	Hard operational errors - operation failed, can be either media or drive failure.
%055 (45)	Bad microcode file	
%056 (46)	Large read	
%057 (47)	Runaway tape	
%060 (48)	Not ready	
%061 (49)	Channel error	
%062 (50)	Formatter power off	
%063 (51)	Drive power off	
%126 (86)	Z80	Hard selftest errors - controller continues to respond to each EIO with the same error until it is reset by a PUP LOADMICROCODE command, controller power off, or processor reset.
%127 (87)	Parity	
%130 (88)	Writeread loop	
%131 (89)	Register	
%132 (90)	Buffer	
%133 (91)	CTC	
%146 (102)	Z80 parity	Hard controller errors - controller continues to respond to each EIO with the same error until it is reset by a PUP LOADMICROCODE command, controller power off, or processor reset.
%147 (103)	Freeze timeout	
%150 (104)	External interrupt	
%151 (105)	Bad memory accesss	
%152 (106)	Operation timeout	
%153 (107)	OBUS parity	
%154 (108)	FCU ROM parity	
%155 (109)	Adapter failure	
%156 (110)	FCU command nack	

5520 SERIAL MATRIX PRINTER. For the 5520 Serial Printer, <dev-status> is the primary status returned from the printer. The format of this word is:

Bit	Meaning
.<0:8>	Not defined
.<9:11>	= Full Status Field 0: Partial Status 1: Full Status 2: Full Status / VFU Fault 3: Reserved for future use 4: Full Status / Data Parity Error 5: Full Status / Buffer Overflow 6: Full Status / Bail Open 7: Full Status / Auxiliary Status Available
.<12>	= Buffer Full
.<13>	= Paper Out
.<14>	= Device Power On
.<15>	= Device Not Ready

<param1> is the auxiliary status word if <dev-status>.<9:11> = 7; otherwise, <param1> = 0. The format of this word is:

Bit	Meaning
.<0:8>	Not Defined
.<9:13>	= Auxiliary Status 0: No Errors This Field 1: No Shuttle Motion 2: Character Generator Absent 3: VFU Channel Error 4-31: Reserved For Future Use
.<14.15>	= 3

<param2> is the file system error. Refer to the GUARDIAN Operating System Programming Manual for details of file system errors.

TIL CONTROLLER. For the TIL Controller, <dev-status> is the status word returned from the device, shown in the following format:

Bit	Meaning
.<0>	= Power On
.<1>	= Command Reject
.<2>	= Undefined
.<3>	= Retry
.<4>	= Overrun Error
.<5>	= IBM Data Parity Error
.<6>	= Odd Length Read
.<7>	= Hardware Error
.<8>	= Incorrect Length
.<9>	= Command Cancelled
.<10>	= Enable Translation
.<11>	= Long Timeout
.<12>	= Interface Connected
.<13:15>	= Protocol Violation: 000: No violation 001: IBM command received other than expected 010: IBM command received other than expected 011: IBM command received other than expected 100: IBM command received other than expected 101: IBM command received other than expected 111: Interface adapter power failed and was restored.

<param1> is the Address/Command word for the last EIO. The format of this word is:

Bit	Meaning
.<0:7>	= Command Code %030: READ, no translation %130: READ, translation enabled %004: WRITE, no translation %104: WRITE, translation enabled %034: CONNECT REQUEST %054: SET WAIT MODE, no long timeout %074: SET WAIT MODE, long timeout %334: DISCONNECT %214: CANCEL PREVIOUS COMMAND
.<8:12>	= Controller Number
.<13:15>	= Unit Number

<param2> is the file system error. If <dev-state> bit <7> is set, then <param3> is the value of the PC_SAVE register of the controller when the hardware error was detected; otherwise, <param3> is zero.

DATA COMMUNICATIONS LINES. For data communications lines, <dev-status> is the status word returned by the controller, in the format described below.

- For the Asynchronous Controller, interpret the bits of the status word as follows (when set to 1):

Bit	Meaning
.<4>	Reverse channel sensed
.<5>	Clear to send sensed
.<6>	Carrier detect sensed
.<7>	Data set ready sensed
.<8>	Channel parity error
.<9>	Channel abort
.<10>	Character overrun
.<11>	Device parity error
.<12>	Byte count termination
.<13>	ETX compare
.<14>	Character compare
.<15>	Break

- For the Byte-Synchronous Controller, interpret the bits of the status word as follows (when set to 1):

Bit	Meaning (WRITE UNIT)	Bit	Meaning (READ UNIT)
.<0>	Power on	.<0>	Power on
.<1>	Channel underrun	.<1>	Device overrun
.<2>	Channel abort	.<2>	Channel abort
.<3>	Channel parity error	.<3>	Unused
.<4>	Auto poll termination	.<4>	BCC error
.<5>	Data set ready termination	.<5>	VRC error
.<6>	Modem loss	.<6>	Modem loss

Bits <8:15> of <dev-status> have the following meanings if modem loss is detected or, for a write unit, if a VRC error is reported:

Bit	Meaning (WRITE UNIT)	Bit	Meaning (READ UNIT)
.<7>	Byte count termination	.<7>	Byte count termination
.<8>	Data set ready	.<8>	Data set ready
.<9>	Modem loss sensed	.<9>	Modem loss sensed
.<10>	Data carrier detected	.<10>	Data carrier detected
.<11>	Clear to send	.<11>	Clear to send
.<12>	DSR interrupt	.<12>	DSR interrupt
.<13>	Control carrier enable	.<13>	Control carrier enable
.<14>	Request to send	.<14>	Request to send
.<15>	Data terminal ready	.<15>	Data terminal ready

When no modem loss is detected or, for a write unit, no VRC error is reported, bits <8:15> of <dev-status> have the following meanings:

Bit	Meaning (WRITE UNIT)	Bit	Meaning (READ UNIT)
.<7>	Byte count termination	.<7>	Byte count termination
.<8>		.<8>	ETB/ETX sensed
.<9>		.<9>	SOH/STX sensed
.<10>		.<10>	
.<11>	State count	.<11>	
.<12>		.<12>	State count
.<13>		.<13>	
.<14>		.<14>	
.<15>		.<15>	

- For the Bit-Synchronous Controller, interpret the bits of the status word as follows (when set to 1):

Bit	Meaning (WRITE UNIT)	Bit	Meaning (READ UNIT)
.<0>	Power on	.<0>	0
.<1>	Channel underrun	.<1>	Channel underrun
.<2>	Channel abort	.<2>	Channel abort
.<3>	Channel parity error	.<3>	0
.<4>	Modem loss	.<4>	Modem loss
.<5>	0	.<5>	Read byte overrun
.<6>	Transmit underrun	.<6>	Receiver overrun
.<7>	No encryption	.<7>	No encryption

Bit	Meaning (AUTOPOLL)	Bit	Meaning (MODEM CONTROL)
.<0>	0	.<0>	0
.<1>	Channel underrun	.<1>	0
.<2>	Channel abort	.<2>	0
.<3>	Channel parity error	.<3>	0
.<4>	Modem loss	.<4>	0
.<5>	Autopoll terminated	.<5>	0
.<6>	Transmit underrun	.<6>	DSR, data set ready interrupt
.<7>	0	.<7>	0

If modem loss is detected, bits <8:15> indicate modem status as follows:

Bit	Meaning
.<8>	DSR*, data set ready (inverted)
.<9>	CD*, carrier detect (inverted)
.<10>	CTS*, clear to send (inverted)
.<11>	Transmit overrun
.<12>	RS-422
.<13>	Maintenance mode
.<14>	RTS, request to send
.<15>	DTR, data terminal ready

If no modem loss is detected, bits <8:15> have the following meanings:

Bit	Meaning (WRITE UNIT)	Bit	Meaning (READ UNIT)
.<8>		.<8>	Receiver error
.<9>		.<9>	ABC.<0>, assembled bit count
.<10>		.<10>	ABC.<1>
.<11>	Ending state count	.<11>	ABC.<2>
.<12>		.<12>	Receiver overrun error
.<13>		.<13>	Abort/Go-Ahead char detected
.<14>		.<14>	Receiver end-of-message
.<15>		.<15>	0

Bit	Meaning (AUTOPOLL)	Bit	Meaning (MODEM CONTROL)
.<8>	0	.<8>	DSR*, data set ready (inverted)
.<9>	0	.<9>	CD*, carrier detect (inverted)
.<10>	0	.<10>	CTS*, clear to send (inverted)
.<11>	0	.<11>	Transmit overrun
.<12>	0	.<12>	RS-422
.<13>	0	.<13>	Maintenance mode
.<14>	End of poll list	.<14>	RTS, request to send
.<15>	End of poll	.<15>	DTR, data terminal ready

For all data communications lines, <param1> is a mask designating acceptable status bits. (For instance, the expression -- <dev-status> LAND $COMP <param1> -- yields the condition causing the message.) <param2> indicates the octal value of the file system error (see the GUARDIAN Operating System Programming Manual).

Decoding the Parameters of CSS-Related Messages

The console messages generated specifically for the 6100 Communications Subystem (CSS) can return up to three parameters of information useful when interpreting the event reported. The specific console messages that return one or more of these parameters are 146, 147, 148, 149, 151, 153, 154, and 155. Table B.2, which can serve as a quick reference for the CSS-related console messages, lists the message numbers and summarizes the parameters that apply to each.

The CSM error codes, the CLIP status byte, the EIO status word (RDST), the BOB source errors, and the interrupt cause word (RIC) are then further explained in the paragraphs that follow.

CSM ERROR CODES. The error codes returned by the 6100 Communications Subsystem Manager (CSM) appear in %<parm3> of console messages 146 and 148 and in %<parm4> of console message 149. Table B.3 lists the possible error values, the associated literals, and their meanings.

Table B.2 Parameter Summary for CSS-Related Messages

Msg #	%<parm3>	%<parm4>	%<parm5>
141	N/A	N/A	N/A
142	Process Code Address	N/A	N/A
143	Statistics Counter 7	Statistics Counter 8	N/A
144	N/A	N/A	N/A
145	Disc Error Code	N/A	N/A
146	CSM Error Code	N/A	N/A
147	CLIP Status Byte	N/A	N/A
148	CSM Error Code	EIO Status (RDST)	EIO parm
149	New CIU Status 0 - RUNNING 1 - SUSPENDED 2 - STOPPED 4 - BOOT 8 - DIAGNOSE	CSM Error Code	N/A
150	Requester PID	CLIP path, status	CLIP subchannel
151	CLB frame A and C	Seq #, BOB source	N/A
152	CLB frame A and C	Seq #, Cause 0 - Invalid message checksum 1 - Invalid command sequence number 2 - Invalid command code 3 - Invalid command parameter	Rejected C and seq #
153	CLB frame A and C	Seq #, BOB source	BOB sense
154	EIO Status (RDST)	GUARDIAN error code	EIO Command
155	Int Cause (RIC)	GUARDIAN error code	EIO Command
156	Send state	Receive state	N/A
157	Error Type 0 - Unexpected Frame 1 - Invalid A field 2 - Invalid C field 3 - Invalid T field 4 - Invalid S field 1 - Invalid function	Frame A,C	Frame T,S
158	Frame f,m	N/A	N/A
159	N/A	N/A	N/A
160	Determined by CAP	Determined by CAP	Determined by CAP
164	Frame f,m	CAP Error code	Determined by CAP
165	Subdevice number	Frame f,m	Status

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Table B.3 CSM Error Codes (Console Messages 146, 148, and 149)

Error (octal)	Literal	Meaning
1004	CSM^ERR^CPUDOWN	CSM attempted operation in a CPU that failed.
1005	CSM^ERR^IN^DIAGNOSE	CIU in DIAGNOSE state when it received request; could not perform the operation.
1008	CSM^ERR^FORMAT	Invalid header in the software image read from disc during attempted download operation.
1009	CSM^ERR^DISC	CSM detected disc error when trying to read the software image during attempted download.
1014	CSM^ERR^SUSPENDED	User tried to SUSPEND an already suspended object.
1016	CSM^ERR^STOPPED	The named object has either stopped or was never started, and the requested operation requires that the object be started.
1017	CSM^ERR^STARTED	The named object has been started, and requested operation requires that the object be stopped.
1018	CSM^ERR^ACTIVATE	The named object has been activated, and requested operation requires that the object be suspended.
1021	CSM^ERR^TRACE^IN^ PROGRESS	User attempted to initiate a trace on a data link with a trace already in progress.
1022	CSM^ERR^MSGTYPE	The CMI request contained an invalid message TYPE.
1023	CSM^ERR^VALUE	CSM received an attribute value that was invalid for one or more of the following reasons: - exceeded allowed range - integer or string value expected and not received - values out of sequence in a multivalue attribute
1025	CSM^ERR^NO^DIAGNOSE	CIU needed to be in DIAGNOSE state to perform the requested operation.
1100	CSM^ERR^IOERROR	I/O error occurred while CSM was attempting the requested operation.
1101	CSM^ERR^TIMEOUT	Error due to timeout.
1102	CSM^ERR^BUFSHORT	Insufficient buffer space for requested operation.
1103	CSM^ERR^CANCEL	Requested operation was canceled.
1104	CSM^ERR^NOPATH	CSM attempted an I/O operation and detected a path failure.
1105	CSM^ERR^INTERNAL	Internal error occurred while CSM was attempting the requested operation.
1106	CSM^ERR^BUSY	A CLIP is busy conducting a periodic test or a previously requested operation.
	CSM^ERR^NOBUF	No buffer or local pool buffer space is available to perform the requested operation.
	CSM^ERR^OWNERSHIP	Operation aborted because requested by someone other than the owner of the process.

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CLIP STATUS BYTE. The CLIP status byte appears in %<parm3> of console message 147 and in %<parm4> of console message 150. Interpret the contents of this byte as follows:

Not Owner	In Boot	Error					
MSB> 0	1	2	3	4	5	6	7 <LSB

If the "Not Owner" bit is set, the status was received from the backup port, which does not respond to a large number of commands.

If the "In Boot" bit is set, the CLIP is operating from the bootstrap, where the command set is limited.

The error field typically reports "fatal" errors; that is, errors that force the CLIP to reenter the bootstrap from running code. Interpret the error field as follows:

0 - No error
1 - CLIP PON
2 - Deadman timer expired (nonmaskable interrupt)
3 - RAM parity error
4 - Reset command frame received
5 - LIM power fault
6 - Instruction failure (SWI2, SWI3, bad jump to trap code)
7 - Deadman timer expired (CLIP RESET)
8 through 15 - Reserved
16 - Buffer pool boundary tag destroyed (kernel detected)
17 - CLB task transmit state machine failure
18 - CLB task receive state machine failure
19 through 31 - Reserved for kernel or CLB errors
32 through 63 - Reserved for application-detected failures

EIO STATUS WORD (RDST). The EIO status word (RDST) is returned by the CIU and provides two levels of information:

- Has the EIO instruction been accepted by the CIU?
- Has the CIU been downloaded and is it executing from downloaded microcode?

The EIO status word appears in %<parm4> of console message 148 and in %<parm3> of console message 154. Interpret its contents as follows:

O	I	B	P	UNL	INV	PAR	TST	CEN	LOP	ZERO					
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Bit	Meaning (if set on)
0	Ownership error. The CIU received an EIO instruction on an I/O channel port that did not "own" the CIU.
1	Interrupt bit. The target CIU has an interrupt pending in the port interface interrupt registers.
2	Busy bit. The CIU is busy executing another operation and may be interrupted only by a privileged EIO instruction; or the CIU is unable to accept any EIO instructions, except TAKEOWNERSHIP, KILLPORT and RESET; or the EIO queue is full; or the CIU PON received a front panel RESET on the owning I/O channel port; or the CIU PON received a RESET or TAKEOWNERSHIP EIO.
3	Parity error detected during transfer of the parameter word. The CIU discards the EIO instruction. If detected during transfer of a command word, the CIU is not selected, and the I/O channel times out the EIO instruction.
4	The CIU is executing microcode out of its bootstrap PROM.
5	The CIU received an invalid EIO instruction.
6	The CIU has been shut down because of a parity error, or the parity-checking circuitry is disabled.
7	The CIU is performing or has failed a self test. Self tests occur after a PON, a front panel reset, or a RESET EIO command.
8	The CIU has enabled the CLB controllers.
9	The CIU set the CLB controllers into loopback mode.

BOB SOURCE ERRORS. The Break Out Board (BOB) issues unsolicited messages when it detects certain conditions. Fatal errors generate console message 151, while conditions that warrant only a warning generate console message 153. In both cases, the BOB SOURCE field appears in %<parm4> of the message and indicates the cause. BOB fatal errors have SOURCE values greater than 100 decimal (octal %144), and BOB warnings have SOURCE values less than 100 (octal %0 through %143). When the BOB SOURCE value is %0 through %13 (power supply warnings), %<parm5> contains the BOB SENSE, a measured value of the power supply status when the BOB warning was issued.

Tables B.4 and B.5 decode the BOB SOURCE values for console messages 151 (fatal error) and 153 (warning), respectively.

Table B.4 BOB SOURCE Values - Console Message 151

Value	Meaning
%144	BOB PON—The BOB +5V power came into spec from either a power off or a power invalid condition. Also occurs on external reset of the BOB.
%145	BOB LIM PON—The BOB LIM power came into spec from a power invalid condition.
%146	Deadman timer expired—The BOB processor failed to reset the deadman timer before an overflow. Normally, this means that a hardware or software failure caused the BOB to execute improperly.
%147	EPROM checksum error—A routine check of the BOB's EPROM detected a checksum error.
%150	BOB NVRAM checksum error—The generated checksum of the BOB's NVRAM did not match the stored checksum (only checked during operations which use the NVRAM).
%151	CLB protocol transmit retry limit exceeded.
%152	CLB transmit underrun error—An underrun was detected during transmission.
%153	ADC conversion error.
%154	Command decode software check.
%155	CLB state machine software check.

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Table B.5 BOB SOURCE Values - Console Message 153

Value	Meaning
%0	Power supply 0 warning: +6.5 volt output upper limit exceeded
%1	Power supply 0 warning: +6.5 volt output lower limit exceeded
%2	Power supply 0 warning: +13 volt output upper limit exceeded
%3	Power supply 0 warning: +13 volt output lower limit exceeded
%4	Power supply 0 warning: −13 volt output upper limit exceeded
%5	Power supply 0 warning: −13 volt output lower limit exceeded
%6	Power supply 1 warning: +6.5 volt output upper limit exceeded
%7	Power supply 1 warning: +6.5 volt output lower limit exceeded
%10	Power supply 1 warning: +13 volt output upper limit exceeded
%11	Power supply 1 warning: +13 volt output lower limit exceeded
%12	Power supply 1 warning: −13 volt output upper limit exceeded
%13	Power supply 1 warning: −13 volt output lower limit exceeded
%14	Fan failure—occurs when one of the subsystem fans stops working.
%15	CLB multiplexor error—occurs when the CLB multiplexor detects an error and the CLIP has been disabled.
%16	CLB received frame queue overflow.

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INTERRUPT CAUSE WORD (RIC). The interrupt cause word (RIC) appears in %<parm3> of console message 155. The Communications Interface Unit of the CSS uses the interrupt cause word both to report CIU/CLB error conditions and to report the successful completion of I/O operations. Since the CIU performs full-duplex I/O, it can generate both outbound and inbound interrupts. The CIU generates outbound interrupts on even-numbered units, reporting the final status of all transfers from the NonStop II system to the CIU, BOB, and CLIPs. It generates inbound interrupts on odd-numbered units, reporting the final status of all transfers to the NonStop II system from the CIU, BOB, and CLIPs.

The interpretation of the cause word (see Table B.6) differs in bits 0 through 7, depending on whether an outbound or an inbound interrupt has generated it; in bits 8 through 15 the interpretation is the same both for outbound and inbound and interrupts.

The interrupt cause words for outbound and inbound interrupts have the following format:

OUTBOUND

PON	CHU	CHA	CPE	ZERO				TYPE		CODE					
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

INBOUND

0	CHO	CHA	ZERO					TYPE		CODE					
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Table B.6 Interpretation of the Interrupt Cause Word (Outbound and Inbound Interrupts)

Bit	Meaning (if set on)	
	Outbound	**Inbound**
0	Power on. The CIU has completed the Power ON sequence and is ready to accept EIO instructions.	(None)
1	Channel underrun. The CIU has timed out a reconnect request, or it cannot "keep up" with the CLB.	Channel overrun. The CIU has timed out a reconnect request, or it has received a CLB frame larger than the allocated buffer.
2	Channel abort.	Channel abort.
3	Channel parity error.	(None)
4:7	(None)	(None)
8:9	Type bits. The value contained in these bits indicates how the value in bits 8 through 15 is to be interpreted. The possible types are: 00 - OPERATIONAL interrupts. They indicate what action occurred as the result of an EIO instruction issued to the CIU. They are nonfatal; the CIU continues to function normally, and the unit that generated the interrupt goes to an inactive state and awaits the next EIO instruction. 01 - MICROCODE interrupts. They indicate a failure in the microcode, either a software queue overflow or a state failure. They are fatal and are reported only on unit 0. The CIU disables the CLB and all I/O channel activity. Contact your Tandem representative. 10 - HARDWARE interrupts. They indicate a hardware failure. They too are fatal and are reported only on unit 0. The CIU disables the CLB and all I/O channel activity. The HARDWARE interrupt codes are not documented here. Contact your Tandem representative. 11 - ILLEGAL interrupts. They should never be generated by the CIU. If you receive a cause word with bits 8 and 9 set, it indicates that the CIU has malfunctioned in an undetectable manner. Shut down the CIU and contact your Tandem representative.	

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Table B.6 Interpretation of the Interrupt Cause Word (continued)

Bit	Meaning (if set on)	
10:15	Bits 10:15 indicate the actual interrupt cause.	
	When bits 8:9 are both set to 0 (OPERATIONAL type interrupts), interpret bits 10:15 as follows:	
	%1	Operation completed without error.
	%2	Write operation terminated without transferring any data across the CLB.
	%3	TX CLB controller aborted the frame being transferred across the CLB.
	%4	The CIU detected an improper CLB address.
	%5	The CIU detected a frame size smaller than the minimum (two bytes, address and C-field).
	%6	The CIU detected a C-field TAG other than write data.
	%7	Read completion code indicating that data transferred to the Nonstop II system contained a frame check sequence error.
	%10	Read completion code indicating that the frame transferred to the Nonstop II system was aborted by the sender.
	%11	Read completion code indicating that the RX CLB controller has been overrun.
	%12	Read completion code indicating that the last byte of the frame received by the Nonstop II system did not contain eight bits.
	%13	Write completion code indicating that the CIU timed out the WAK response to a write data frame.
	%14	Read completion code indicating that the CIU timed out the WAK response to a read enable frame three consecutive times.
	%15	Read completion code indicating that the CIU timed out the FLAK response to a FLSH frame three consecutive times.
	%16	Read completion code indicating that the CIU received a WAK frame from the CLIP/BOB when no WAK was expected.
	%17	Reserved for future use.
	%20	The specified LOCS starting address is out of range.
	%21	The specified LOCS starting address and byte count resulted in an ending address that is out of range.
	%22	The specified LOCS byte count plus ten exceeded the IOC buffer size.
	%23	The required two bytes of zero did not appear before the LOCS address and byte count.
	%24	The LOCS block checksum was not equal to the checksum calculated by the CIU during the transfer to the CIU.
	%25	The START EXECUTION EIO instruction specified a starting address that was not within the proper range ($D200 through $EFFF).
	%26	The CIU has not been downloaded.
	%27	The issued EIO instruction was not valid on this unit.
	%30	The parameter word transferred with this EIO instruction was invalid.
	%31	Reserved for future use.

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Table B.6 Interpretation of the Interrupt Cause Word (continued)

Bit	Meaning (If set on)	
	%32	The NVRAM was either programmed incorrectly or not programmed at all. Impossible to return a valid identification block.
	%33-%77	Reserved for future use.
	When bits 8:9 are set to 01 (MICROCODE type interrupts), interpret bits 10:15 as follows:	
	%0	The CIU detected a microcode state failure. A nonprivileged EIO instruction was received on a unit not in an IDLE state.
	%1	The CIU detected a microcode state failure. The software receive state machine accessed the software link state machine when it shouldn't have.
	%2	The CIU detected a microcode state failure. The software transmit state machine accessed the software link state machine when it shouldn't have.
	%3	The CIU detected a microcode state failure. A unit has been reported from the software linked timing list when the link state for the unit indicates that no responses are being timed.
	%4	The CIU detected a microcode state failure. The software link state machine requested a transfer by the software receive state machine when it shouldn't have.
	%5	The CIU detected a microcode state failure. The software link state machine requested a transfer by the software transmit state machine when it shouldn't have.
	%6	The CIU detected a microcode state failure. The software transmit state machine received an I/O channel completion for a unit not waiting for a completion.
	%7	The CIU detected a microcode state failure. The software transmit state machine received a CLB transmission completion for a unit not waiting for a completion.
	%10	The CIU detected a microcode state failure. The software transmit state machine popped a unit off the software transmit queue that did not have a transmission request pending.
	%11-%37	Reserved for future use.
	%40	The CIU microcode attempted to queue an interrupt when the queue was already full.
	%41	The CIU microcode attempted to queue a transmission when the queue was already full.
	%42	The CIU attempted to add a unit to the timing list and the unit was already on the list.
	%43	The operation just completed was a write, and the control block entry indicates another write pending.
	%44-%77	Reserved for future use.

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Table B.7 is a summary of all console messages. The entries in the code column are defined as follows:

Rep = Call your Tandem representative.
Act = Take the appropriate action (see the definition of the message).
Inform = Information only; no corrective action.

Table B.7 Console Messages Summary

Console Number	Code	Description of Message
01	Act	LDEV <ldev> [%<ccu>] UNEXPECTED MOUNT <dev-status> (BEL)
02	Act	LDEV <ldev> [%<ccu>] UNABLE TO ACCESS LABEL (BEL)
03	Act/Rep	LDEV <ldev> [%<ccu>] I/O BUS ERROR <error> (BEL)
04	Act/Rep	LDEV <ldev> [%<ccu>] ERROR <dev-status> <param1> <param2> <param3> (BEL)
05	Inform	LDEV <ldev> [%<ccu>] RETRY <dev-status> <param1> <param2> <param3>
06	Inform	LDEV <ldev> [%<ccu>] UP
07	Rep	LDEV <ldev> [%<ccu>] DOWN (BEL)
08	Inform	LDEV <ldev> [%<ccu>] STAT1 <stl-f1> <stl-f2> <stl-f3>
09	Inform	LDEV <ldev> [%<ccu>] STAT2 <st2-f1> <st2-f2> <st2-f3>
10	Act/Rep	LDEV ???? CU %<ccu> KILLED (BEL)
11	Act	LDEV <ldev> [%<ccu>] INCONSISTENT MIRROR VOLUMES
12	Rep	LDEV <ldev> [%<ccu>] TOO MANY MESSAGES
13	Inform	LOG TERMINAL LDEV <ldev>, SYS <sysnum>, DISC LOGGING ON
14	Inform	LOG TERMINAL LDEV <ldev>, SYS <sysnum>, DISC LOGGING OFF
15	Inform	LOG TERMINAL LDEV <ldev>, DISC LOGGING ON
16	Inform	LOG TERMINAL LDEV <ldev>, DISC LOGGING OFF
17	Act/Rep	OPERATOR TERMINAL I/O ERROR <error> (BEL)
18	Act/Rep	$AOPR I/O ERROR <error> (BEL)
19	Act/Rep	OPERATOR DISC FILE I/O ERROR <error> (BEL)
20	Rep	X BUS TO PROCESSOR <n> DOWN (BEL)
21	Rep	Y BUS TO PROCESSOR <n> DOWN (BEL)
22	Inform	X BUS TO PROCESSOR <n> UP (BEL)
23	Inform	Y BUS TO PROCESSOR <n> UP (BEL)
24	Rep	X BUS ERRORS TO PROCESSOR <n> <timeouts> <resends>
25	Rep	Y BUS ERRORS TO PROCESSOR <n> <timeouts> <resends>
26	Rep	X BUS ERRORS FROM PROCESSOR <n> <checksum errors>
27	Rep	Y BUS ERRORS FROM PROCESSOR <n> <checksum errors>
28	Inform	BUS SEQ ERRORS FROM PROCESSOR <n> <seq-err> <unexpected>
29	Inform	LDEV <ldev> [%<ccu>] CORRECTABLE ECC ERRORS - <numerrs> %<address1> %<address2>
30	Rep	UNCORRECTABLE MEMORY ERROR: %<syndrome1> %<syndrome2> %<syndrome3> (BEL)
31	Rep	BAD VOLUME LABEL, SECTION <param> (BEL)
32		CORRECTABLE MEMORY ERROR: %<syndrome1> %<syndrome2> %<syndrome3>
33	Rep	LDEV <ldev> { NET: / X25: } LINE QUALITY <nnn>
34	Inform	NET: LOGGING AT SYS <nnn>
35	Inform	NET: LOCAL LOGGING RESUMED
36	Inform	OPERATOR MESSAGE LOST <num>
37	Rep	CCL RETURNED FROM IIO/HIIO, %<status1>, %<status2>, %<status3> (BEL)

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Table B.7 Console Messages Summary (continued)

Console Number	Code	Description of Message
40	Rep	PROCESSOR <cpu> IS DOWN (BEL)
41	Inform	PROCESSOR UP
42	Inform	* POWER ON * (BEL)
43	Inform	LDEV <ldev> NET: CONNECTION LOST TO SYS <nnn> <xxx> (BEL)
44	Inform	LDEV <ldev> [NET: / X25:] LINE READY
45	Inform	LDEV <ldev> [NET: / X25:] LINE NOT READY, ERROR <errnum> (BEL)
46	Inform	LDEV <ldev> NET: CONNECTED TO SYS <nnn>
47	Inform	LDEV <ldev> NET: LVL 4 TIMEOUT TO SYS <nnn> (BEL)
48	Inform	NET: SYS <nnn> CPU STATUS <pppppppppppppppp> (BEL)
49	Inform	LDEV <ldev> NET: SYS <nnn> NOT RESPONDING (BEL)
50	Rep	CAN'T ALLOCATE RECEIVER'S LCB FOR <cpu,pin> (BEL)
51	Rep	CAN'T ALLOCATE SENDER'S LCB FOR <cpu,pin> (BEL)
52	Rep	$RECEIVE QUEUE FOR <cpu,pin> LONGER THAN 10 REQUESTS
54	Inform	NUMBER OF FREE LCBS IS LESS THAN 10% OF THE POOL
55	Inform	<num> LCB ALLOCATION WAITS
61	Rep	SCHANL ERROR %<status1> %<status2>
62	Rep	EIO BUS ERROR <errnum> EIO STATUS %<status1>, %<status2>
63	Rep	IIO/HIIO BUS CHANNEL ERR<num> <status1> <status2> <status3> <status4>
64	Act	MUST USE PUP REBUILDDFS
65	Act/Rep	LDEV <ldev> [%<ccu>] UNEXPECTED INTERRUPT <dev-status> (BEL)
66	Rep	LDEV <ldev> DAX:LEVEL I STATE %<ssssss> EVENT <ee>
67	Act	LDEV <ldev> DAX: SUBDEV <ddd> ERROR <errnum>
68	Inform	EXERCISE START
69	Inform	EXERCISE STOP
70	Act	QUAD MICROCODE FILE ERROR <errnum> (BEL)
71	Act	FLOATING POINT MICROCODE FILE ERROR <errnum> (BEL)
72	Act	UNABLE TO OPEN OSIMAGE FILE ERROR <errnum> (BEL)
73	Act	UNABLE TO CREATE COMINT, NEWPROCESS ERROR <errnum> (BEL)
74	Rep	PROCESS INTERNAL ERROR %<param> (BEL)
75	Act	SYSTEM COLD LOADED FROM A DOWNED DISC
80	Inform	CONSOLE LOGGING OF SYSTEM MESSAGE <number> ENABLED
81	Inform	CONSOLE LOGGING OF SYSTEM MESSAGE <number> DISABLED
82	Inform	CONSOLE LOGGING OF SYSTEM MESSAGES ENABLED
83	Inform	CONSOLE LOGGING OF SYSTEM MESSAGES DISABLED
84	Act	AUDCONFG FILE OPEN FAILURE ERROR <error> (BEL)
85	Act	AUDCONFG FILE I/O ERROR <error> (BEL)
86	Act	AUDIT FILE OPEN ERROR <error>, SEQ <number> (BEL)
87	Act	AUDIT FILE WRITE ERROR <error>, SEQ <number> (BEL)
88	Act	UNABLE TO COMMUNICATE WITH BACKOUT PROCESS, ERROR <error> (BEL)
89	Act	BACKOUT ERROR <error> TRANSACTION SEQ <number> (BEL)
90	Act	TOO MANY LINES GEN'D FOR THIS PATH (BEL)
91	Act	ILLEGAL SUBTYPE SPECIFIED (BEL)
92	Act	TMF SUSPENDED DUE TO MULTI-CPU FAILURE: FILE CONSISTENCY IN DOUBT (BEL)
93	Inform	TMF SUSPENDED BEGIN-TRANSACTIONS: AUDIT TRAIL <number> AT 'MAXFILES' (BEL)
94	Inform	TMF ENABLED BEGIN-TRANSACTIONS: NO AUDIT TRAILS AT 'MAXFILES'
95	Act	TMP ENCOUNTERED UNEXPECTED ERROR (<error>) ON LINK TO REMOTE TMP ON SYSTEM <system> (BEL)
96	Rep	TMP COULD NOT FIND DISTRIBUTED TRANSACTION (SEQ NO <number>) IN NAT (BEL)
97	Act/Rep	LDEV <ldev> [%<ccu>] ERROR <dev-status> <ms-adr> <ls-adr> PHYS (BEL)
98	Inform	LDEV <ldev> [%<ccu>] RETRY <dev-status> <ms-adr> <ls-adr> PHYS
99	Rep	TMF INTERNAL ERROR <error> DETAIL CODE %<xxxxxx> (BEL)

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Table B.7 Console Messages Summary (continued)

Console Number	Code	Description of Message
100	Act	LDEV <ldev> [%<ccu>] MICROCODE LOADING FAILURE <param1><param2> (BEL)
101	Inform	LDEV <ldev> [%<ccu>] MICROCODE EXECUTION FAILURE (BEL)
102	Act	LDEV <ldev> [%<ccu>] MICROCODE LOADED SUCCESSFULLY <param>(BEL)
103	Rep	LDEV <ldev> [%<ccu>] INTERRUPT OVERRUN, CURRENT STATUS <param1>, PREVIOUS STATUS <param2> (BEL)
104	Rep	LDEV <ldev> [%<ccu>] FATAL CONTROLLER ERROR <dev-status> <param1> <param2> <param3> (BEL)
105		TMP COMMUNICATION ERROR <error>
106	Act	LDEV <ldev> INSUFFICIENT BUFFER SPACE ALLOCATED IN SYSGEN
107	Rep	LDEV <ldev> [%<ccu>] UNIT LITERAL PROM %<nnn>INCOMPATIBLE WITH DISC SUBTYPE
108	Act/Rep	LDEV <ldev> [%<ccu>] INCORRECT UNIT TYPE <u1>;DISC SUBTYPE <ss>EXPECTS UNIT TYPE <u2>
110	Inform	SYSTEM CLOCK RESET
111	Act	LDEV <ldev> DAX: SUBDEV <ddd> RE-POLL STATE <s>
112	Act	LDEV <ldev> DAX: SUBDEV <ddd> SELECTED AND NOT OPEN/JOINED, DATA DISCARDED
131	Act	QUAD MICROCODE INCOMPATIBLE WITH CURRENT SOFTWARE VERSION (BEL)
132	Act	FLOATING POINT MICROCODE INCOMPATIBLE WITH CURRENT SOFTWARE VERSION (BEL)
133	Inform	<path> BUS DOWN
134	Inform	<path> BUS UP
135	Rep	<path> BUS SHUT DOWN TO CLUSTER <cc>, PROCESSOR <pp>
136	Rep	<path> BUS ERRORS TO CLUSTER <cc>, PROCESSOR <pp> <ttttt> <wwwww>
137	Rep	X BUS ERRORS FROM CLUSTER <cc>, PROCESSOR <pp><ccccc> <rrrrr>
138	Rep	Y BUS ERRORS FROM CLUSTER <cc>, PROCESSOR <pp><ccccc> <rrrrr>
139	Rep	BUS SEQ ERRORS FROM CLUSTER <cc>, PROCESSOR <pp><sssss><uuuuu>
140	Rep	CAN'T ALLOCATE RECEIVER'S LCB FOR CLUSTER <cc>, PROCESS ID <pp,ppp>
141	Inform	LDEV <ldev> [CU %%<ccu>] CLIP DOWNLOADED, CIU <path>
142	Rep	LDEV <ldev> [CU %<ccu>] IO PROCESS MEMORY ERROR, CIU <path> %<parm3>
143	Act/Rep	LDEV <ldev> [CU %<ccu>] STAT3, CIU <path>%<parm3> %<parm4>
144	Inform	LDEV <ldev> [CU %<ccu>] CMI TRACE SEGMENT FULL, TRACE STOPPED, CIU <path>
145	Act/Rep	LDEV <ldev> [CU %<ccu>] CSS DOWNLOAD DISC ERROR, CIU <path> %<parm3>
146	Act/Rep	LDEV <ldev> [CU %<ccu>] CSS DOWNLOAD UNIT ERROR, CIU <path> %<parm3>
147	Rep	LDEV <ldev> [CU %<ccu>] CSS STATUS PROBE ERROR, CIU <path> %<parm3>
148	Inform	LDEV <ldev> [CU %<ccu>] CSS CIU ERROR, CIU <path> %<parm3> %<parm4> %<parm5>
149	Act/Rep	LDEV <ldev> [CU %<ccu>] CSS CIU STATUS CHANGE, CIU <path> %<parm3> %<parm4>
150	Inform	LDEV <ldev> [CU %<ccu>] CSS ACTIVATE PATH, CIU <path> %<parm3> %<parm4> %<parm5>
151	Rep	LDEV <ldev> [CU %<ccu>] CSS BOB FATAL ERROR FRAME, CIU <path> %<parm3> %<parm4>
152	Act/Rep	LDEV <ldev> [CU %<ccu>] CSS CLB COMMAND REJECT, CIU <path> %<parm3> %<parm4> %<parm5>
153	Act/Rep	LDEV <ldev> [CU %<ccu>] CSS BOB WARNING RECEIVED, CIU <path> %<parm3> %<parm4> %<parm5>
154	Act/Rep	LDEV <ldev> [CU %<ccu>] CSS EIO ERROR, CIU <path> %<parm3> %<parm4> %<parm5>
155	Act/Rep	LDEV <ldev> [CU %<ccu>] CSS INTERRUPT ERROR, CIU <path> %<parm3> %<parm4> %<parm5>
156	Rep	LDEV <ldev> [CU %<ccu>] CSS NO RESPONSE, CIU <path> %<parm3> %<parm4>

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Table B.7 Console Messages Summary (continued)

Console Number	Code	Description of Message
157	Rep	LDEV <ldev> [CU %<ccu>] CSS FRAME ERROR, CIU <path> %<parm3> %<parm4> %<parm5>
158	Rep	LDEV <ldev> [CU %<ccu>] CSS UNEXPECTED BREAKPOINT, CIU <path> %<parm3>
159	Inform	LDEV <ldev> [CU %<ccu>] CSS BUFFER UNAVAILABLE, CIU <path>
160	Rep	LDEV <ldev> [CU %<ccu>] CSS LIU CONFIGURATION ERROR, CIU <path> %<parm3> %<parm4> %<parm5>
161	Act	REVIVE FAILED TO FIX UP DISC MICROCODE SECTION
164	Rep	LDEV <ldev> [CU %<ccu>] CSS LINE ERROR, CIU <path> %<parm3> %<parm4> %<parm5>
165	Rep	LDEV <ldev> [CU %<ccu>] CSS SUBDEVICE ERROR, CIU <path> %<parm3> %<parm4> %<parm5>
166	Act/Rep	LDEV <ldev> LBU <x> NO RESPONSE TO STATUS POLL
167	Inform	LDEV <ldev> LBU <x> RESET HAS OCCURRED
168	Inform	LDEV <ldev> LBU <x> STANDARD MICROCODE LOADED
169	Rep	LDEV <ldev> LBU <x> LOAD FAILED - FILE <fff>, FLAGS %<nnnnnn>, STATUS %<ooo>, RESET %<rrr>, MCERR <mmm>
170	Inform	LDEV <ldev> LBU <x> WCS LOAD FOUND ACCEPTABLE
171	Rep	LDEV <ldev> LBU <x> CONTROLLER FAILED - RESET %<rrr>, FLAGS %<nnnnn>, STATUS %<ooo>
172	Rep	LDEV <ldev> LBU <x> EXCESSIVE ERRORS OCCURRING
173	Rep	LDEV <ldev> PATH TO CLUSTER <cc> MAY HAVE FAILED - CHECK SUBNET STATUS
174	Rep	LDEV <ldev> IPB MONITOR FAILURE SYNDROME <aaaaa> <bbbbb>
188	Rep	UNABLE TO CREATE AUDIT TRAIL #<xxx> SEQ #<xxxxxx> DUE TO MAXFILES (BEL)

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APPENDIX C
COLD-LOAD ERRORS

C.0 COLD-LOAD ERRORS

When certain errors occur during a cold-load operation, the processor halts and an octal error number appears in the Switch Register display (sometimes accompanied by an error message on the console), and the SD Register contains error code %000074.

The cold-load messages are:

UNABLE TO CREATE COMINT, NEWPROCESS ERROR <err num>

System cannot create start-up Command Interpreter. <err num> denotes the File System error, which determines corrective action to take.

SYSTEM COLD LOADED FROM A DOWNED DISC

System was cold loaded from a disc in the down state. Load the system from the corresponding mirror volume.

UNABLE TO OPEN OSIMAGE, FILE ERROR # <err num>

System cannot load the operating system images because file in which it resides cannot be opened. <err num> denotes the File System error, which determines corrective action to take.

NOTE

File System errors are described in the GUARDIAN Operating System Programming Manual (Part Numbers 82336-B00 and 82337-B00).

The Switch Register error numbers are:

Error No.	Meaning
%20	Schannel interrupt occurred. Check Switch Register for proper subchannel number. If this value is correct, choose another device from which to load; if it is incorrect, enter proper value and load.
%21	Uncorrectable memory error occurred.
%22	Memory-access breakpoint occurred.
%23	Instruction failure occurred.
%24	Page-fault interrupt occurred.
%30	CCL condition resulted from EIO instruction. Error caused by input-output problem or incorrect subchannel number in Switch Register. Check Switch Register contents. If this number is correct, choose another device from which to load; if it is incorrect, enter proper value and load.
%31	CCG condition resulted from IIO instruction. Error caused by input-output problem or incorrect subchannel number in Switch Register. Check Switch Register contents. If this number is correct, choose another device from which to load; if it is incorrect, enter proper value and load.
%32	Bad INTERRUPT CAUSE word was encountered. Error caused by input-output problem or incorrect subchannel number in Switch Register. Check Switch Register contents. If this number is correct, choose another device from which to load; if it is incorrect, enter proper value and load.
%33	Bad IOC STATUS word was encountered, perhaps caused by insufficient real memory available. Error may be related to input-output problem or incorrect subchannel number in Switch Register. Check Switch Register contents. If this number is correct, choose another device from which to load; if it is incorrect, enter proper value and load.
%34	Checksum error occurred during disc read operation. Error caused by input-output problem or incorrect subchannel number in Switch Register. Check Switch Register contents. If this number is correct, choose another device from which to load; if it is incorrect, enter proper value and load.
%35	System attempted to read tape ten times, but still failed to do so. Check tape.
%36	Attempted to load tape written in wrong format. Check tape.

Error No.	Meaning
%37	Interrupt timeout occurred. Error caused by input-output problem or incorrect subchannel number in Switch Register. Check Switch Register contents. If this number is correct, choose another device from which to load; if it is incorrect, enter proper value and load.
%40	Writeable Control Store operation could not be verified.
%41	Switch Register contained unacceptable value. Check register and change to proper setting.
%42	Volume label did not contain disc bootstrap loader. Label disc.
%43	Insufficient memory available for requested configuration. Choose another operating system image.
%44	Volume label did not contain directory. Relabel volume.
%45	Disc or specified SYSnn subvolume did not contain operating system image. Select disc or subvolume with this image.
%46	File error encountered in directory. Relabel volume.
%47	Not enough physical memory.
%50	Checksum error occurred during the system cold-load from tape.

APPENDIX D
LOBUG ERROR MESSAGES

D.0 LOBUG ERROR MESSAGES

ADDRESS CANNOT EXCEED 16 BITS

The logical address (not extended), required by LOBUG syntax, evaluated to more than 16 bits.

BAD CPU TYPE

The function to be performed or the command that was entered is invalid for the currently selected processor.

BAD SPAD ENTERED

The scratchpad address entered in the command line is invalid. Either the user entered a non-octal value, or the octal value is out of the address range of the scratchpad area.

BAD SYNTAX

The syntax of the command entered is invalid.

BAD EXPRESSION SYNTAX

The syntax of the expression entered (i.e., arithmetic calculations) is invalid.

CAN'T STEP, HALT STATUS IS UNKNOWN

An attempt has been made to single-step the selected processor, but the OSP cannot determine the cause of the IPU entering a halt loop. The operator must resolve the ambiguity by entering the appropriate command, LHLT or FREEZE; he may then single-step the processor.

COMMAND NOT ENABLED AT PMI

An attempt was made to perform an OSP function that is enabled by the reset ENABLE switch of the PMI, but the switch was in the DISABLE position.

COMMAND NOT ACKNOWLEDGED BY IPU

There is no response to a command directed to the selected IPU. The command type was: Display/Modify Registers, Display/Modify Memory, LOAD, or Set Memory Access Breakpoint.

COOPERATIVE CODE BREAKPOINT HAS OCCURRED

This message appears on the 25th line of the OSP when the processor has executed a cooperative code breakpoint unless the user is in LOBUG. In that case, the message is displayed not on the 25th line, but at the LOBUG prompt.

COOPERATIVE MEMORY ACCESS BREAKPOINT HAS OCCURRED

This message appears on the 25th line of the OSP when the processor has executed a cooperative memory access breakpoint unless the user is in LOBUG. In that case the message is displayed not on the 25th line, but at the LOBUG prompt.

CPU DID NOT ENTER HALT LOOP

The selected processor did not respond properly to a HALT or FREEZE command.

COUNT MAY NOT EXCEED %377

There is a limit (%377) to the number of words that can be displayed using a D command. This limit was exceeded.

DIAGNOSTIC MODE IS REQUIRED FOR THIS COMMAND

A command was issued that cannot be acted upon unless the OSP is enabled for diagnostic operation, but either the OSP DIAGNOSE switch is in the DISABLE position or the LOCKED/MAINTENANCE switch is in the LOCKED position.

DIAGNOSTICS MUST BE TERMINATED BEFORE USING LOBUG

An attempt was made to execute a LOBUG command while microdiagnostics were running. No LOBUG commands will be executed until all running microdiagnostics are properly terminated.

DUPLICATE BREAKPOINT

An attempt was made to set a breakpoint that duplicates another breakpoint in regard to code segment and logical address.

FAILED TO OBTAIN REGISTERS FROM THIS IPU

The selected processor did not return the contents of the registers when commanded to do so by LOBUG. The IPU microcode or the OSP/IPU communication path is not functioning properly.

IMPROPER OR MISSING DELIMITER

The command and parameters entered cannot be parsed because of missing or undefined delimiters.

INVALID CPU NUMBER

An attempt was made to select a processor whose number was not in the range: 0 to 15 (decimal).

INVALID LOAD SWITCHES

An attempt was made to enter a non-octal value or an octal value greater than %177777 into the switch register during a load operation.

INVALID STACK MARKER

A T command encountered a bad L register value in the first stack marker.

IPU BREAKPOINT TABLE IS FULL

There is no space in the IPU breakpoint table for cooperative breakpoints. The command was ignored.

LOADING LOBUG

LOBUG overlay is being loaded. This message is displayed when the operator enters a LOBUG command, and the OSP determines that LOBUG is not currently resident in memory, but must be loaded from the floppy diskette.

MAB ALREADY SET

An attempt was made to set a cooperative memory access breakpoint while the standalone MAB for that processor was in effect, or an attempt was made to set an unprivileged MAB while a privileged MAB was set.

MEMORY READ FAILED

An attempt to read processor memory has failed.

MEMORY WRITE FAILED

An attempt to write to the processor memory has failed.

NO CURRENT BREAKPOINT

The Clear Breakpoint (C) command was ignored because no breakpoint is defined as being "current."

NO SUCH BREAKPOINT

The breakpoint specified in a Clear Breakpoint (C) command cannot be found.

NO IPU RESPONSE TO EXTENDED MEMORY READ

The IPU failed to respond to the OSP request to read extended memory.

NO USER LIBRARY SEGMENT DEFINED

An attempt was made to display, modify, or set a breakpoint in the user library, but there is no user library segment defined for this process.

OSP BREAKPOINT TABLE IS FULL

There is no space in the OSP breakpoint table for standalone breakpoints. The command was ignored.

PAGE EXCEEDS SEGMENT BOUNDS

The extended address specified in the issued command is not defined for the selected segment.

PARAMETER EXCEEDS ALLOWED RANGE

The parameter entered on the command line exceeds the valid range.

PRIVILEGED MEMORY ACCESS BREAKPOINT HAS OCCURRED

This message appears on the 25th line of the OSP when the processor has executed a memory access breakpoint unless the user is in LOBUG. In that case, the message is displayed not on the 25th line, but where the LOBUG prompt is.

PROCESSOR IS NOT IN HALT LOOP

An operation has been attempted that requires that the selected processor be in a HALT LOOP, but the processor is not in a HALT LOOP.

PROCESS DOES NOT EXIST

An attempt was made to access the address spaces of a process using the V command, but the Process Identification Number (PIN) does not exist.

PTC MISS

An attempt to read extended memory failed because the extended address is not in the page table cache.

PTC READ FAILED

An attempt to read the page table cache has failed.

PTC WRITE FAILED

An attempt to write to the page table cache has failed.

RELATIVE SEGMENT IS UNDEFINED

The specified relative extended address cannot be defined for the current process.

REQUESTED PAGE IS ABSENT

The issued command cannot be executed because the required memory page is absent.

SCRATCHPAD REGISTER READ FAIL

An attempt to read the given scratchpad register address has failed.

SCRATCHPAD REGISTER WRITE FAIL

An attempt to write to the given scratchpad register address has failed.

SHORT SEGMENT TABLE READ FAIL

An attempt to read the short segment table has failed.

SHORT SEGMENT TABLE WRITE FAIL

An attempt to write to the short segment table has failed.

SPECIFIED ADDRESS IS NOT IN CODE SPACE

An attempt was made to set a breakpoint in a segment that is not a code segment.

STANDALONE CODE BREAKPOINT HAS OCCURRED

This message appears on the 25th line of the OSP when the processor has executed a standalone code breakpoint unless the user is in LOBUG. In that case, the message is displayed not on the 25th line, but ate the LOBUG prompt.

STANDALONE MEMORY ACCESS BREAKPOINT HAS OCCURRED

This message appears on the 25th line of the OSP when the processor has executed a standalone memory access breakpoint unless the user is in LOBUG. In that case, the message is displayed not on the 25th line, but at the LOBUG prompt.

SYSTEM FREEZE NOT ASSERTED

The FREEZE command did not cause a SYSTEM HALT (FREEZE).

SYSTEM FREEZE STILL ASSERTED

The R command did not cancel the SYSTEM HALT REQUEST.

THIS CPU IS NOT BEING POLLED

The selected processor is not being polled; therefore, the OSP does not notice that a FREEZE has been taken.

UNRECOGNIZED COMMAND

The command entered on the command line is undefined.

APPENDIX E
SYNTAX OF LOBUG COMMANDS

E.0 SYNTAX OF LOBUG COMMANDS

Appendix E contains the syntax for certain LOBUG commands that may need further explanation than that given in paragraph 4.8.1 of this manual.

DISPLAYING MEMORY/REGISTERS (A/D Commands)

```
{ A } [ [UC]  <address>  [ [IX]  [ <index value> ] ] ]
{ D }   [UL]               [SX]
        [SC]               [IG]
        [SL]               [SG]
        [L ]               [I ]
        [G ]               [S ]
        [S ]          (index mode)
        [C ]
        [Q ]
        [M ]
        [U ]
  (address mode)
```

A = Display data in ASCII
D = Display data in octal

Address modes:

UC = address in the user code segment
UL = address in the user library segment
SC = address in the system code segment
SL = address in the system library segment
G = address relative to G pointer
L = address relative to L pointer (procedure parameters or local variables)
S = S relative address (subprocedure parameters or sublocal variables)
C = address in the current code segment
Q = address within an extended segment ("Q" segment must first be defined via VQ "--")
M = mapped: User enters map # and logical address
U = unmapped: User supplies physical address (page # and physical displacement) -- NonStop II only

Omitting the above parameters defaults to a G relative address in the user data segment.

<address> = either a 16-bit expression or a 32-bit (double word) expression giving an address in the indicated mode

Index modes:

IX = indirect extended pointer with word index
SX = indirect extended pointer with string indexing
IG = indirect word addressing in system global
SG = indirect string addressing in system global
I = indirect word address
S = indirect string address

MODIFYING REGISTER CONTENTS (M Command)

```
{ M } [ [UC] <address> [ [IX]  [ <index value> ] ] ]
        [UL]             [SX]
        [SC]             [IG]
        [SL]             [SG]
        [L ]             [I ]
        [G ]             [S ]
        [S ]
        [C ]
        [Q ]
        [M ]
        [U ]

      [ { , <new value> } ... ]
```

The parameters for the M command have the same significance as they do for the A/D commands given above.

SETTING BREAKPOINTS (B Command)

a. Cooperative Code Breakpoints

1. Unconditional

```
{B}  [UC]  <address> [ [ ,ALL ]  [ ,IC ] ]
     [UL]
     [SC]
     [SL]
```

2. Conditional

```
{B}  [UC]  <address>  ,  [R0]  [ <test addr> ]
     [UL]                [R1]
     [SC]                [R2]
     [SL]                [R3]
                         [R4]
                         [R5]
                         [R6]
                         [R7]
                         [L ]
                         [S ]
                         [G ]

[ [IG] [ <offset> ] ] [ & <mask> ]  { <> }  <expression>
  [IX]                              {  = }
  [I ]                              {  # }
                                    {  < }
                                    {  > }
```

b. Standalone Code Breakpoints

```
{B}  [UC]  <address> [ ! ]
     [UL]
     [SC]
     [SL]
```

c. Cooperative Memory Access Breakpoints

1. Unconditional

```
{BM} [ [UC]  <address> ]          {,R }  [ [ ,ALL ]  [ ,IC ] ]
       [UL]                       {,W }
       [SC]                       {,RW}
       [SL]                       {,WR}
       [G ]
       [L ]
       [S ]
       [C ]
       [Q ]
       [M ]
       [U ]
```

2. Conditional

```
{BM} [ [UC]  <address> ] [ [IX] ] {,R } , [R0]  [ <test address> ]
       [UL]                [SX]   {,W }   [R1]
       [SC]                [I ]   {,RW}   [R2]
       [SL]                [G ]   {,WR}   [R3]
       [G ]                               [R4]
       [L ]                               [R5]
       [S ]                               [R6]
       [C ]                               [R ]
       [Q ]                               [L ]
       [M ]                               [S ]
       [U ]                               [G ]

          [  [ IG] [ <offset> ] [ & <mask> ]  [<>]  <expression>
             [ IX]                            [= ]
             [ I]                             [# ]
                                              [< ]
                                              [> ]

     [ ,ALL ] [ ,IC ]
```

d. Standalone Memory Access Breakpoints

```
{BM} [ [UC]  <address> ] [ [IX] ] [<offset>]  {,R }  [ ! ]
       [UL]                [SX]               {,W }
       [SC]                [I ]               {,RW}
       [SL]                [G ]               {,WR}
       [G ]
       [L ]
       [S ]
       [C ]
       [Q ]
       [M ]
       [U ]
```

The parameters for the B command have the same significance as they do for the A/D commands given above.

CLEARING BREAKPOINTS (C Command)

a. Cooperative Code Breakpoints

```
C [0]          C = clear current, and C0 = clear all

C [UC]  <address>
  [UL]
  [SC]
  [SL]
```

b. Standalone Code Breakpoints

```
C [0]  [ ! ]     C = clear current, and C0 = clear all

C [UC]  <address>  [ ! ]
  [UL]
  [SC]
  [SL]
```

c. Memory Access Breakpoints

```
C [0]
CM [,ALL]
```

d. Standalone Memory Access Breakpoints

```
CM [ ! ]
```

The parameters for the C command have the same significance as they do for the A/D commands given above.

Computing the Value of an Expression (= Command)

```
{=} <expression>  [ : [ # ]  ]
                      [ B ]
                      [ A ]
```

where [# | B | A] denotes the base in which LOBUG is to display the computed value:

- # = decimal
- B = binary
- A = ASCII

Omitting #, B, and A denotes octal.

APPENDIX F
REGISTER CONTENTS DISPLAYS

F.0 REGISTER CONTENTS DISPLAYS

The REG command displays the physical hardware register of the currently selected CPU. The format for the NonStop II display is shown in Figure F-1, that for the NonStop TXP in Figure F-2.

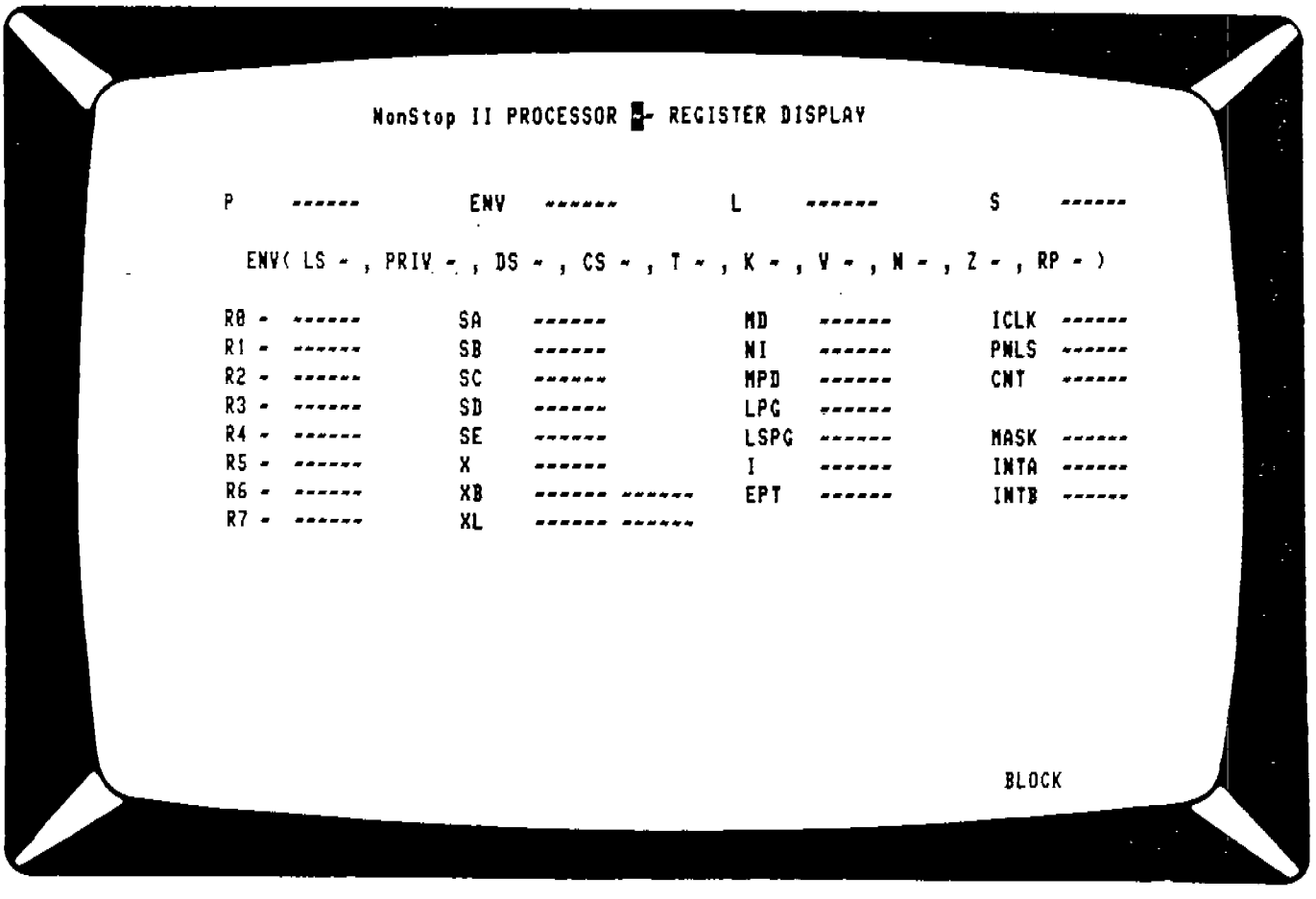

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Figure F-1 NonStop II Register Display

NonStop II Processor Register Display

P	P Register. Contains the macrolevel 'P' register contents.
ENV	Environment Register. Contains the current processor environment. The content of this register is as defined at the processor macrolevel.
L	L Register. Contains the macrolevel 'L' register contents.
S	S Register. Contains the macrolevel 'S' register contents.
R0-R7	Stack Registers. These registers are also referred to as the 'A' through 'H' registers. The addressing of these registers is controlled by the 'RP' field of the ENV register. These registers are available at the macrolevel through use of certain machine level macroinstructions.
SA-SE	Scratch SA through SE Registers. These registers are internal scratch registers used by the processor microcode.
X	Index Register. The content of the X register is one of R5, R6, or R7, as determined by selected bits of the IREG reg.
XB	Extended Base Register. This two-word value represents the Extended Base Address that is used during translation of relocatable addresses to absolute addresses for boundary checking. The value is stored in MAP 14, entry 60:61.
XL	Extended Limit Register. This two-word value represents the Extended Limit Address that is used during translation of relocatable addresses to absolute addresses for boundary checking. The value is stored in MAP 14, entry 62:63.
MD	Memory Data Register. Contains the last word read from main memory.

NI — Next Instruction Register. This register contains the prefetched instruction in the macroinstruction pipeline. This register is loaded from Cache and passes the contents into the I register when the current macroinstruction finishes.

MPD — Map Data Register. This register contains the map data used most recently to access main memory.

LPG — Logical Page Map Absence Register. The LPG register is loaded each time a Logical Page is found absent. The LPG register contains MAP SELection bits and Logical Page bits.

LSPG — Logical Page of CME or UCME Register. The LSPG register is loaded each time the Error Correcting and Detecting Code (ECC) logic determines a main memory word contains either a Correctable (CME) or UnCorrectable (UCME) Memory Error. The LSPG register contains: MAP SELection bits, Logical Page bits, and ECC Syndrome bits.

I — Instruction Register. This is the current macroinstruction being executed. This register is either loaded from the NI register or, under special conditions, directly from Cache.

EPT — Entry Point Register. This register contains the address of Loadable Control Store addressed by the decode of the current contents of the I reg. This is effectively the address of the microcode logic that supports the specific macroinstruction contained within the I register.

ICLK — Interval Clock. This register contains a counter used by the interval clock logic to cause an interrupt every 10ms.

PNLS — Panel Switches Register. This internal register represents the current setting of the front panel switches.

CNT — Count Register. This register is a multipurpose register that provides a general purpose up or down counter and memory map access control to selected memory control operations.

INTA Interrupt A Register. This register is a collection of single data bits that indicate the presence of individual interrupt events. The following list defines each bit:

INTA.<0>	->	SCHANL	Special Channel Interrupt
INTA.<1>	->	UCME	Uncorrectable Memory Error
INTA.<2>	->	BRKPT	Memory Access Breakpoint
INTA.<3>	->		Unused
INTA.<4>	->	DABS	Data Absent
INTA.<5>	->	IABS	Instruction Absent
INTA.<6>	->	ALUOVF	Arithmetic Overflow
INTA.<7>	->	DDT	DDT Character
INTA.<8>	->	PWARN	Power Fail Warning
INTA.<9>	->	CME	Correctable Memory Error
INTA.<10>	->	HIO	High Priority I/O
INTA.<11>	->	XINQF	X Bus In Queue Full
INTA.<12>	->	YINQF	Y Bus In Queue Full
INTA.<13>	->	ICLK	Interval Clock
INTA.<14>	->	LIO	Low priority I/O
INTA.<15>	->	DISP	Dispatcher

Some of the above interrupt bits may be directly set by the processor hardware as a result of the specified event. Other interrupts are set only by processor microcode request. All interrupts may be cleared by processor microcode request.

INTB Interrupt B Register. This register is a collection of single data bits which indicate the presence of individual interrupt events. In addition, this register provides the processor number to the microcode. The following list defines each bit:

INTB.<00:07>		CPU	CPU Number of processor
INTB.<8>	->	HALT	Firmware Halt
INTB.<9>	->	DDTHALT	OSP Halt
INTB.<10>	->	MRST	Manual Reset
INTB.<11>	->	PON	Power On
INTB.<12>	->	OPTC	Option Board
INTB.<13>	->	DIAG	Diag Firmware Reset Test
INTB.<14>	->	NBTN	No Panel Switch Active
INTB.<15>	->	NMEM	Memory Not Available

The CPU number is a hardwired identification number. Most of these interrupts are set directly by processor hardware. All interrupts (<08:15>) can be individually set and cleared by processor microcode.

MASK — Interrupt MASK Register. This register provides a bit by bit mask for the contents of the INTA register. When testing to determine if processor interrupts are pending, the contents of the INTA register are ANDed with the MASK register along with selected bits of the INTB register to determine if INTerrupts are pending. The MASK register is set or cleared only by microcode request. Note that MASK does not prevent interrupts from being recorded in INTA but rather only blocks the INTA interrupts from being included in processor interrupt determination test.

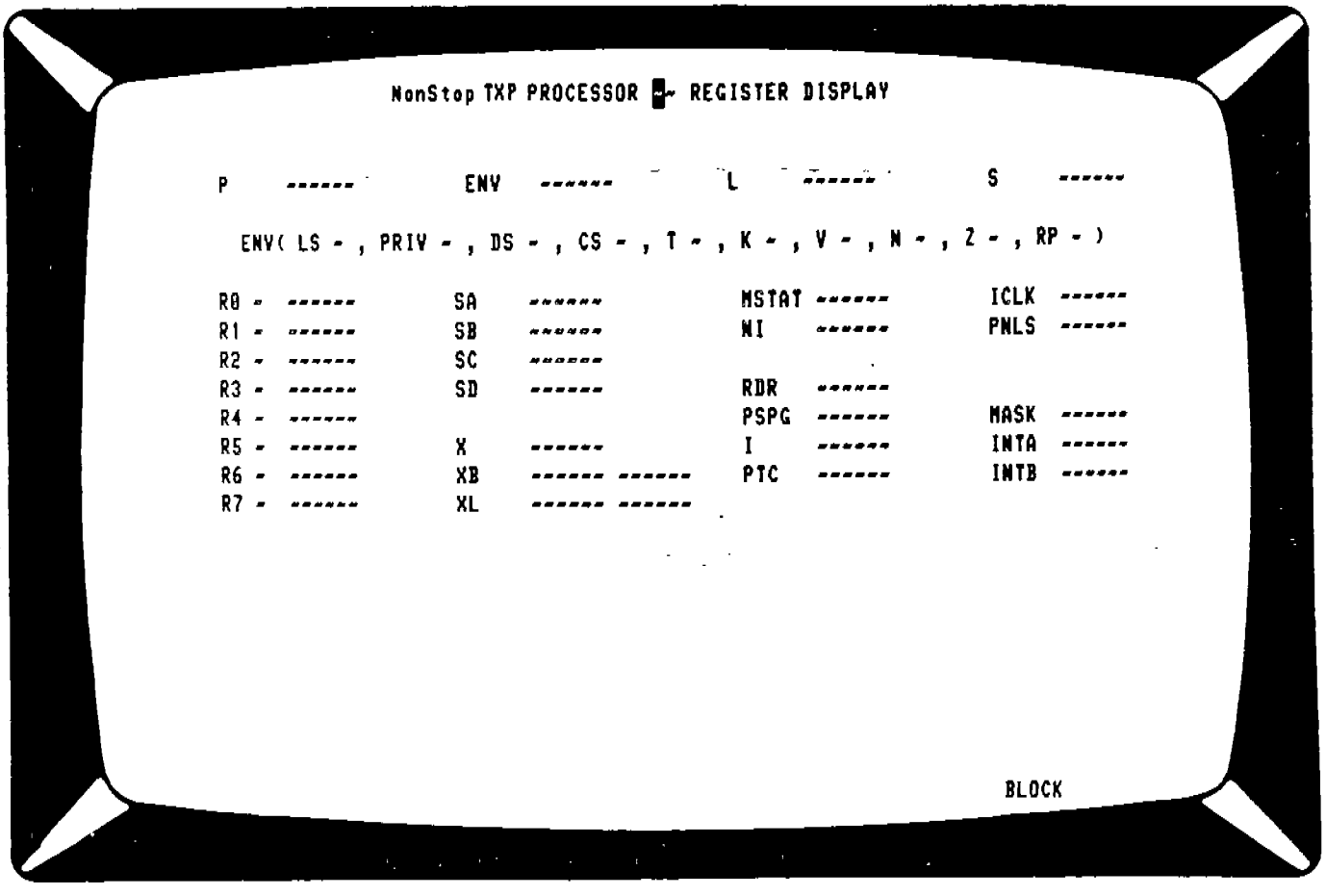

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Figure F-2 NonStop TXP Register Display

NonStop TXP Processor Register Display

P	P Register. Contains the macrolevel 'P' register contents.
ENV	Environment Register. Contains the current processor environment. The content of this register is as defined at the processor macrolevel.
L	L Register. Contains the macrolevel 'L' register contents.
S	S Register. Contains the macrolevel 'S' register contents.
R0-R7	Stack Registers. These registers are also referred to as the 'A' through 'H' registers. The addressing of these registers is controlled by the 'RP' field of the ENV register. These registers are available at the macrolevel through use of certain machine level macroinstructions.
SA-SD	Scratch SA through SD Registers. These registers are internal scratch registers used by the processor microcode.
X	Index Register. The contents of the X register is one of R5, R6, or R7, as determined by selected bits of the IREG and LATEI reg.
XB	Extended Base Register. This two-word value represents the Extended Limit Address that is used during translation of relocatable addresses to absolute addresses for boundary checking. The least significant word of this value is stored in the register file, and the most significant word is stored in the scratchpad registers.
XL	Extended Limit Register. This two-word value represents the Extended Limit Address that is used during translation of relocatable addresses to absolute addresses for boundary checking. The least significant word of this value is stored in the register file, and the most significant word is stored in the scratchpad registers.

MSTAT — Memory Status Register. This collection of data bits indicates the current state of the Memory Control Unit.

MSTAT.<00:05>	->	Syndrome of last received word
MSTAT.<06:07>	->	Word Address Bits. Combined with with PSPG can identify failed RAM in physical memory.
MSTAT.<08>	->	State of RESPONSE signal.
MSTAT.<09>	->	State of OPCHK_ERR signal.
MSTAT.<10>	->	State of MCU_PAUSE signal.
MSTAT.<11>	->	State of RFSH state machine.
MSTAT.<12>	->	State of READ state machine.
MSTAT.<13>	->	State of RCV state machine.
MSTAT.<14>	->	State of WRT state machine.
MSTAT.<15>	->	State of STOR state machine.

These status bits are extensively used by the processor diagnostics to verify the correct operation of the MCU.

NI — Next Instruction Register. This register contains the prefetched instruction in the macroinstruction pipeline. This register is loaded from Cache and passes the contents into the I register when the current macroinstruction finishes.

RDR — Read Data Register. This register is part of the Memory Control Unit. It contains the last data word read from the memory array boards via the MDBUS. This 26-bit register contains 16 data bits and other necessary flags.

PSPG — Physical Page Register. This register is loaded from PTCREG<00:12>. It holds the page address of the current memory access and is used for CME recovery by microcode.

I — Instruction Register. This is the current macroinstruction being executed. This register is loaded either from the NI register or, under special conditions, directly from Cache.

PTC — Page Table Cache Register. This register contains the last entry read from PTC. Each PTC read consists of two portions: the PTC Tag and the PTC Data. When a PTC read is performed, both portions are always returned with the data entry following the tag entry by one clock. The PTC will almost always contain the PTC Data when examined with LOBUG.

ICLK — Interval Timer Register. This register increments once every microsecond. When the counter reaches -1 a timer interrupt is generated, and the timer reloaded with -10,000; thus interrupts are generated every 10ms.

PNLS Panel Switches Register. This internal register represents the current setting of the front panel switches.

INTA Interrupt A Register. This register is a collection of single data bits that indicate the presence of individual interrupt events. The following list defines each bit:

INTA.<0>	->	SCHANL	Special Channel Interrupt
INTA.<1>	->	UCME	Uncorrectable Memory Error
INTA.<2>	->	BRKPT	Memory Access Breakpoint
INTA.<3>	->	XRAY	XRAY Timer
INTA.<4>	->	DABS	Data Absent
INTA.<5>	->	IABS	Instruction Absent
INTA.<6>	->	ALUOVF	Arithmetic Overflow
INTA.<7>	->	DDT	DDT Character
INTA.<8>	->	PWARN	Power Fail Warning
INTA.<9>	->	CME	Correctable Memory Error
INTA.<10>	->	HIO	High Priority I/O
INTA.<11>	->	XINQF	X Bus In Queue Filling
INTA.<12>	->	YINQF	Y Bus In Queue Filling
INTA.<13>	->	ICLK	Interval Clock
INTA.<14>	->	LIO	Low priority I/O
INTA.<15>	->	DISP	Dispatcher

Some of the above interrupt bits may be directly set by the processor hardware as a result of the specified event. Other interrupts are set only by processor microcode request. All interrupts may be cleared by processor microcode request.

INTB Interrupt B Register. This register is a collection of single data bits that indicate the presence of individual interrupt events. In addition, this register provides the processor number to the microcode. The following list defines each bit:

INTB.<00:07>		CPU	CPU Number of Processor
INTB.<8>	->	HALT	Firmware Halt
INTB.<9>	->	DDTHALT	OSP Halt
INTB.<10>	->	IPS_NMEM	Interruptable Power Supply Failure
INTB.<11>	->	PFRESET	Power Fail Reset
INTB.<12>	->	SQ	SQ Board Option
INTB.<13>	->	DIAG	Diagnostic Firmware Reset
INTB.<14>	->	LOADKY	Load Key Flag
INTB.<15>	->	UPS_NMEM	Uninterruptible Power Supply Failure

The CPU number is a hardwired identification number. Most of these interrupts are set directly by processor hardware. All interrupts (<08:15>) can be individually set and cleared by processor microcode.

MASK — Interrupt MASK Register. This register provides a bit by bit mask for the contents of the INTA register. When testing to determine if processor interrupts are pending, the contents of the INTA register are ANDed with the MASK register along with selected bits of the INTB register to determine if INTerrupts are pending. The MASK register is set or cleared only by microcode request. Note that MASK does not prevent interrupts from being recorded in INTA but rather only blocks the INTA interrupts from being included in processor interrupt determination test.

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